PERIODICAL ROOM
GENERAL LIBRARY
UNIV. OF MICH
JAN 29 1932

The JOURNAL of GEOGRAPHY

VOLUME XXXI JANUARY, 1932 NUMBER 1

In This Issue

216 The West Coast of India . . . . *Warren Strain*

217 The Educational Value of Geographic Exhibits for Public Schools . . . . . *Laura O'Day*

219 The Development of the Tung Oil Industry in Florida . . . . . *W. T. Hicks*

225 A European Fair . . . . . *Emily V. Baker*

237 Robert DeCourcy Ward . . . *Richard E. Dodge*

245 Geographical Publications . . . . . .

Published by A. J. Nystrom & Co., for The National Council of Geography Teachers
George J. Miller *Editor*

The JOURNAL *of* GEOGRAPHY

A MAGAZINE FOR SCHOOLS

GEORGE J. MILLER, *Editor*

CORA P. SLETTEN, *Assistant Editor*

State Teachers College, Mankato, Minn.

Associate Editors

B. H. WHITBECK, University of Wisconsin, Madison

R. M. BROWN, Rhode Island College of Education, Providence

E. E. LACKEY, University of Nebraska, Lincoln

ERNA GRASSMUCK, State Teachers College, Indiana, Pa.

A. E. PARKINS, George Peabody College for Teachers, Nashville, Tennessee

D. C. RIDGLEY, Clark University, Worcester, Mass.

SUBSCRIPTION TERMS

The subscription price is $2.50 a year, payable in advance. The price of single copies is 35 cents. Postage is prepaid on subscriptions from the United States, Canal Zone, Republic of Panama, Porto Rico, Cuba, Virgin Islands of the United States, Dominican Republic, Philippines, Guam, Samoan Islands, Hawaii, Mexico, Costa Rica, Guatemala, Nicaragua, Republic of Honduras, Salvador, Argentina, Bolivia, Brazil, Colombia, Ecuador, Paraguay, Peru, Uruguay, Spain and Spanish Colonies. For Canada add for postal and tariff 45¢ on annual subscriptions (total $2.95). On single copies add 5¢ (total 40¢). All other countries in the Postal Union add for postage 27¢ on annual subscriptions (total $2.77), on single copies 3¢ (total 38¢).

The Journal is the official organ of the National Council of Geography Teachers and is sent to all members of the organization. The annual dues, $2.00, are payable to the *Journal of Geography*. Extra postage rates for copies sent to foreign countries should be added to the membership dues.

Patrons are requested to make all remittances payable to the *Journal of Geography*, in postal or express money orders or bank drafts.

Members and subscribers who wish to continue receiving the *Journal* must send remittances promptly to assure the volume being complete.

Send manuscript and books for notice or review to the *Editor*.
Send orders for back numbers to *Journal of Geography*.

Published monthly except June, July and August

PUBLICATION OFFICES: 450-454 AHNAIP STREET, MENASHA, WISCONSIN

Business Correspondence, Membership Dues, and Subscriptions may be sent to Publication office or to

A. J. NYSTROM AND COMPANY

PUBLISHERS, JOURNAL OF GEOGRAPHY

3333 ELSTON AVENUE, CHICAGO

Entered as second-class matter January 15, 1919, at the post office of Menasha, Wisconsin, under the Act of March 3, 1879.

The JOURNAL *of* GEOGRAPHY

CONTENTS FOR JANUARY, 1932

The West Coast of India. By Warren Strain 1

Mr. Strain is an assistant in the geography department at the University of Wisconsin, and during the past summer was an instructor in the Concord State Teachers College, Athens, West Virginia. An article entitled, "Some Geographical Factors in the Growth of Fort Wayne," appeared in the JOURNAL for May, 1929. This is the seventeenth article in our series of experimental writings in human geography.

The Educational Value of Geographic Exhibits for Public Schools. By Laura O'Day 21

Miss O'Day is an associate in geography in the visual education division of the Buffalo Museum of Science, Buffalo, New York.

This is the second article in our new series on HOW TO TEACH IT. The principles which Miss O'Day has set forth should enable the teacher to improve greatly the home-made exhibit which too often is little more than "busy work."

The Development of the Tung Oil Industry in Florida. By W. T. Hicks 27

Mr. Hicks is an instructor in economics and economic geography at the University of Florida, and author of "Taxation in Florida for Community Advertising." At present he is carrying on his graduate work at Northwestern University.

A European Fair. By Emily V. Baker 35

Miss Baker is a critic teacher in grades five and six, State Teachers College, Valley City, North Dakota. She has devoted thirteen years to the supervision and teaching of elementary grade geography, part of this time being spent in the Illinois State Normal University at Normal, Illinois.

This is the third article in our series HOW TO TEACH IT.

Robert DeCourcy Ward. By Richard E. Dodge 39

Geographical Publications 40

Contents of the JOURNAL are indexed regularly in the *Educational Index to Periodicals.*

Authors alone are responsible for opinions and statements in the JOURNAL.

PROPERLY TAUGHT

geography becomes a vital, impressive study—not a collection of cold, unrelated facts.

A good teacher (*one who believes that geography should teach life*) plus a good textbook (*Brigham and McFarlane's Essentials of Geography is the best* possible series for such teaching) will accomplish wonders in this far-reaching, important subject.

The ***Manual for Teachers,*** issued in connection with ***Brigham and McFarlane's Essentials of Geography,*** offers much practical help to the teacher who wishes to increase her knowledge and teaching power. The breadth of this discussion is indicated by the following chapter headings in the second half of the book: **Geography in the Higher Grades; Methods of Teaching Geography; Problems in Geography; The Use of Pictures; Field Work for Older Pupils; Geography as a Social Science; Minimum Essentials; Books for Teachers.**

Brigham and McFarlane's Geographies are published in a Two-book and a Four-book Edition with State Supplements

AMERICAN BOOK COMPANY

New York Cincinnati Chicago Boston Atlanta

McGraw-Hill

brings to your attention the new second edition of

ECONOMIC GEOGRAPHY *of* SOUTH AMERICA

by R. H. WHITBECK

Professor of Geography, University of Wisconsin

430 pages, 6 x 9, 197 illustrations, $3.50

The revisions effected in this new edition of Professor Whitbeck's well-known textbook bring it entirely up to date with the most recent available material.

Statistical matter is corrected to cover the latest developments.

The graphs have been remade to conform with recent economic fluctuations and changes.

Human adjustments and activities in South America as they are influenced by the physical environment are interpreted. The book is characterized by a clear and interesting style and a sympathetic attitude toward Southern peoples.

Send for a copy on approval

McGRAW-HILL BOOK COMPANY, Inc.

330 West 42nd Street New York

The JOURNAL *of* GEOGRAPHY

Copyright, 1932, The Journal of Geography

VOLUME XXXI JANUARY, 1932 NUMBER 1

GEOGRAPHY OF THE WEST COAST OF INDIA*

WARREN STRAIN
University of Wisconsin

From the crest of the Western Ghats, which forms a definite boundary on the eastern side, spur after spur of mountains stretch seaward far into the coastal strip, and gradually the deep ravines, dense forests and tangled jungles of the mountains give way to the

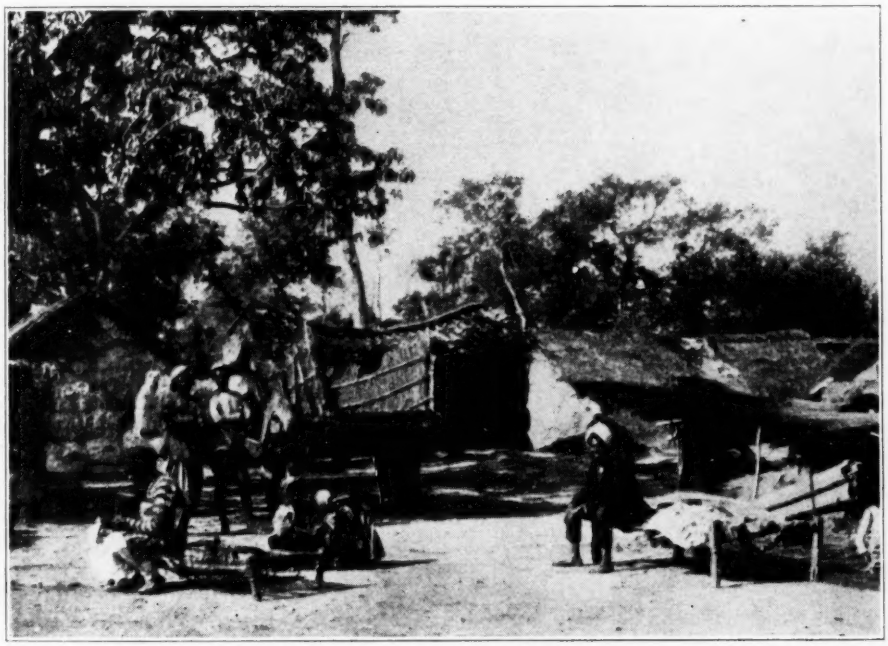


FIG. 1. A typical rural village in the northern part of the West Coast Region. The house types and materials of construction may be seen. Notice the large two wheeled oxcart in the foreground. Courtesy of the India State Railway Bureau, New York.

* The writer wishes to acknowledge the assistance of Dr. Glenn T. Trewartha, Department of Geography, University of Wisconsin, under whose direction this investigation was made.

more gentle slopes of the undulating hills and ever broadening valleys which are occupied by the intensively cultivated paddy fields. Well watered by the never failing southwest monsoon, the discontinuous patches of alluvium south of the Damanganga River stands out as a great rice producing area. During the rainy season sufficient rain falls to permit the growing of rice without either irrigation or inundation altho it is true that the floors of most of the valleys are inundated at the height of the monsoon. On the intervening laterite hills may be found the villages of the cultivators (Fig. 1). Coarse grass and thickets of bushes form the natural vegetation cover of these varkas lands[1] but in places grams, millets and tapioca have been planted.

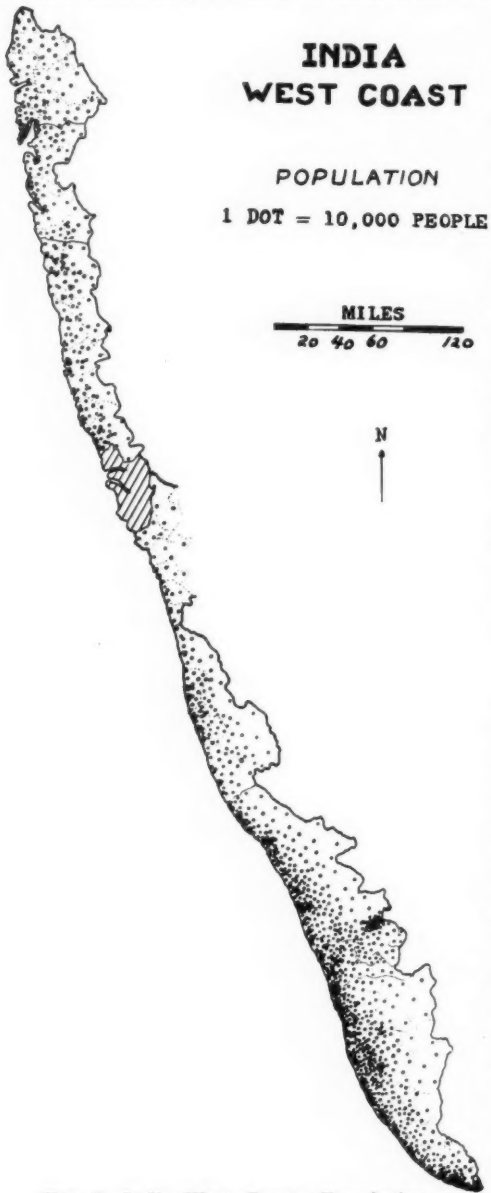


FIG. 2. India West Coast—Population.

Bordering the sea in the southern part of the region is a sandy littoral, backed by numerous lagoons and covered with groves of coconut palms. This sandy coastal strip contains a larger number of villages than any other part of the region and here also are located important cities, formerly famed in the export of spices. Fishing is carried on along the coast and fishing villages are peacefully nestled among the graceful palms.

[1] Varkas lands is an Indian term meaning uplands.

Seaward from the slope of the Ghats, the entire region is characterized by a dense rural population, three hundred fifty to four hundred per square mile.[2] Ninety per cent of the total population is rural, living in small villages or individual homesteads.

Major contrasts in both the cultural and natural landscapes give rise to three belts or subdivisions which roughly parallel the coast. These are (1) The Barrier Beach Coconut Division; (2) The Mixed Paddy and Varkas Lands; (3) The Forested Slopes of the Ghats (Fig. 3).

I. The Barrier Beach Coconut Division

The barrier beach which is the characteristic land form of the outer part of the Malabar Coast is the site of numerous fishing villages and intensive cultivation of coconut palms (Fig. 4, Coconut Map). Roads and railroads take advantage of the slightly elevated land altho the common mode of travel is by boat on the lagoons, landward from the beach. These lagoons, or "kayals," altho not continuous have

FIG. 3. I. Barrier Beach Coconut Division. II. The Mixed Paddy and Varkas Lands. II A. The Northern Rice and Millet Unit. II B. The Southern Rice, Tapioca, and Spice Unit. III. The Forested Slopes of the Ghats.

[2] Data from the Census of India, 1921. Volumes 7, 13, 25.

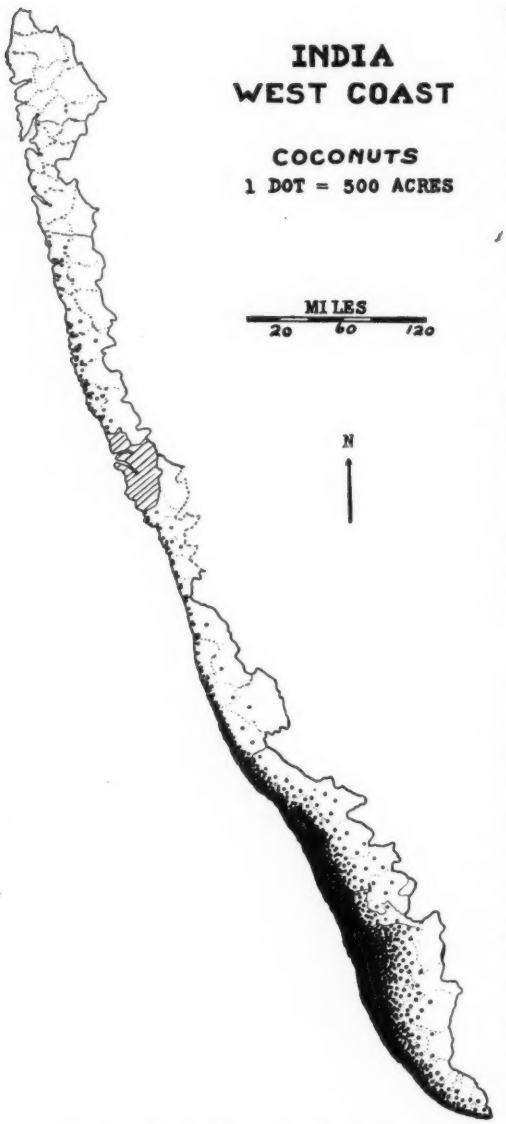


FIG. 4. The marked concentration of coconuts along the coast in the southern portion of the region is striking. Their absence in the north is likewise noticeable. Ruled areas indicate that no statistics were available.

been connected by canals until it is possible to travel continuously by water in a north-south direction for over two hundred miles (Fig. 5. A section of the coast in the south). The kayals vary in size from two or three square miles to several hundred square miles in area. When the depth is sufficient to permit the entrance of ships, the kayals make excellent harbors and it is in such sites that many coast towns have grown. Probably the best known are Calicut, Cochin, and Mangalore.

Scattered here and there among the palms are the small homesteads of the ryot.[3] Located on his own small farm, varying in size from three to six acres, is the neatly thatched cottage of the farmer. Coconut palms surround the house and between the rows of trees, vegetables are grown for home consumption or for sale in the nearby towns. The cattle, which are used in preparing the sandy soil for planting, roam about at will when not in use. Low mud fences roofed with palm leaves to prevent their slumping during the rains, keep the cattle out of certain sections of the farm.

Living on an individual plot as is customary in Malabar, is quite

[3] Ryot is a native term meaning farmer.

in contrast to conditions in most parts of India where the farmers live in villages. This peculiarity may be explained in the fact that when a crop is of a permanent character its produce can be well secured only if the ryot lives on the spot. Thus living on the land is a necessity in this division.

Very evident in the gardens are the tin cones which surround the trunks of the coconut trees about six feet above the ground. This is a protective measure against rats which attack the young nuts before the hard shell is formed. Unless this precaution is taken the ryot's crop may be ruined before he is aware of the presence of the rats.

It is impossible to think of the ryot of this division without thinking of the coconut because it is very intimately associated with his life. The leaves are braided together, making mats which are used both for the walls and the roof of his cottage. From the coir fiber his fishing nets are made. The meat is used as food, especially as a fat, and may in part reflect the climatic hostilities toward the rearing of good cattle and the consequent lack of animal fats. The oil is extracted in various ways but the machine used by most people and therefore most evident in the landscape is the old pestle-mortar mill (Fig. 6).

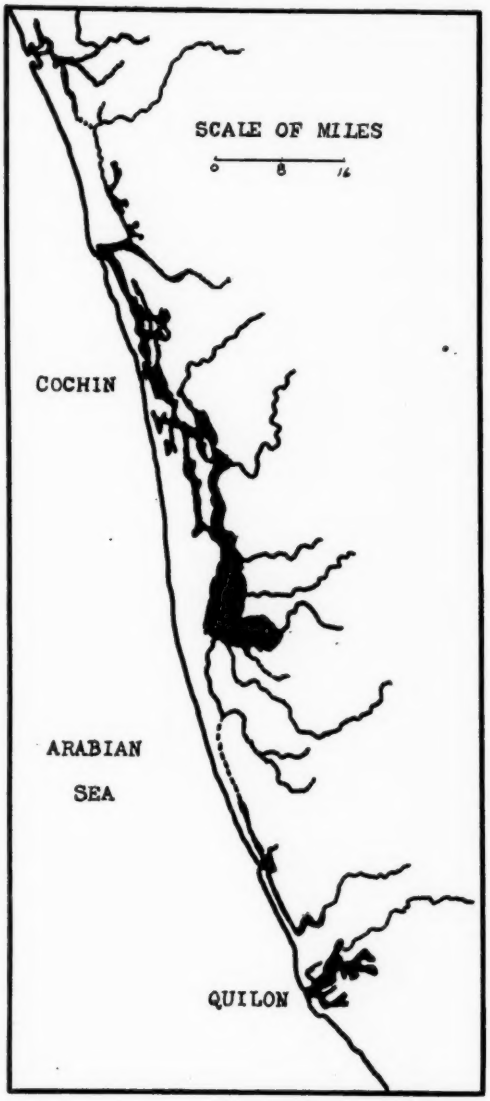


FIG. 5. Sketch map of section of the southwest coast showing the kayals. The shaded area represents the lagoons. The dotted lines show canals. The cities of Cochin and Quilon are located on the narrow beach facing the kayals. From Survey of India. Calcutta, 1916.

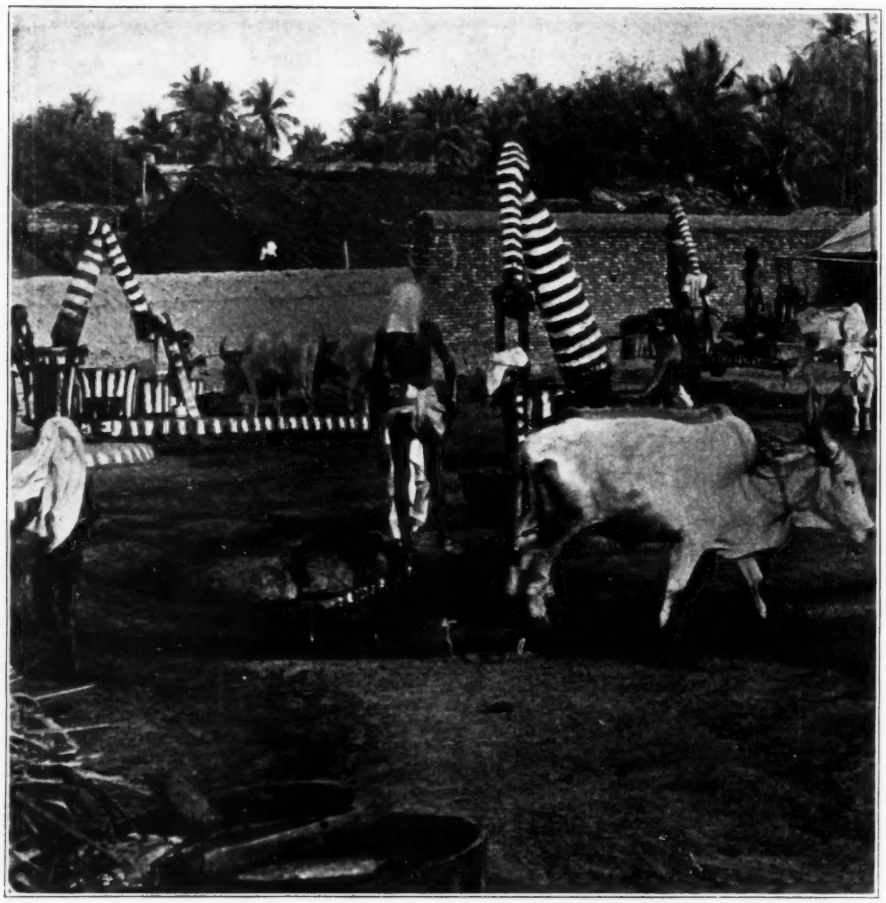


FIG. 6. A group of pestle-mortar mills used for the expression of oil from the coconuts and other oil seeds. The seeds are placed in the mortar which is made from a large log or a stone block, and as the oxen go around and around the pestle presses the oil from the seeds. The mills are painted red and white to indicate that the owner belongs to a certain caste. The dress of the laborers gives a clue to temperature conditions and the luxurious growth of vegetation in the background is typical of rain-forest type of climate. Some idea of the type of dwelling may be obtained from the picture of the house behind the mud and brick wall. Brick manufacturing is an important item in the industrial development of some of the towns of this division. Photo by Ewing Galloway, N.Y.

Every village has a few of these country mills and in the political district of Malabar alone there are about five thousand. The efficiency of the crude machine is very low and the total output in a day seldom exceeds eighty gallons of oil per mill. In the cities along the coast, modern steam pressure methods are being used and may

eventually take the place of the numerous crude mills altho the Indian Census shows that in the decade between 1911 and 1921, there was no increase in the number of power presses in this division.[4] Several factors combine to make the transition a slow process, among which are, the abundance of cheap labor, the high cost of establishing a power press, and the prejudiced ideas about the inferior quality of oilmeal which is produced as a by-product.

In connection with the production of nuts, the cottage industry of coir weaving has developed. Coir is the yarn made from the husk of the coconuts and is woven into rope, mats, and even fishing nets. This area is the only commercial producer of coir in India and it is a common sight to see half naked natives sitting in the shade, weaving rope and other products from the fiber. In the district of South Kanara, about five thousand people depend on the manufacture and sale of coir as a source of income.[5]

Fishing is important along the coast and besides producing food, which is consumed in both the fresh and salted form, the waste material is sold to the ryot and used as fertilizer. This source of fertilizer is very important to the farmers in their production of annual crops.

PORTS OF THE DIVISION

Where streams have cut channels of sufficient depth, from the kayals to the sea, to warrant the passage of ships, port cities are found. Thus the city of Cochin, lying on the lagoon at the mouth of the Cochin River has a magnificent natural harbor, several square miles in area with a deep basin of seven to nine fathoms near the mouth which is kept free from silting by tidal scour. However, a bar about a mile off shore prevents the entrance of large ships, since while it carries a maximum of eighteen feet of water at high tide, it has only twelve feet at low tide. This necessitates the anchorage of large ships out beyond the bar and loading must be done by means of lighters. Cochin serves as an entrepot port for the cities farther south along the coast. The shallow offshore water makes it impossible for even the large coastwise trading boats to call at the harbors of Alleppy, Quillon, or Trivandrum. Each of these cities is also located on the kayals and most of their trade is carried on thru Cochin by means of flat bottomed boats on the lagoons. Cochin has a large coasting and foreign trade. The

[4] Census of India 1921. Volumes 13 and 25. Calcutta.

[5] Watt, Sir George. Commercial Products of India. Murray, London. 1908. Page 355.

most important exports are coconut oil, coir, spices, tea, and wood. Rice, textiles, and machinery are the chief imports.

Farther up the coast is the ancient city of Calicut which early developed into a commercial city. The interest of Europeans was drawn to the city following Vasco de Gama's first trip to India in 1498, for with this trip began the commercial relations between Europe and India. Numerous sailing routes focused on the city and soon it became the trading center for spices and cotton cloth in the Orient. Portuguese interest increased and attempts were made to get permanent locations in the town but they were soon informed that foreigners were not wanted. Several years of struggle ensued with the result that the city was twice bombarded and finally burned, thus greatly retarding its commercial growth. Altho the city is still growing in a steady manner,[6] it is doubtful if it will ever attain the important position it once held along the West Coast. As in the earlier days, the port reflects the hinterland it serves. Coffee and tea are brought down to the harbor from Mysore and Coorg and traded for piece goods, salt, and coconut oil. Coffee, coir, and pepper make up half of the exports of Calicut while salt, rice and other grains, piece goods, and metal ware make up the chief imports. It may therefore be seen that the thriving textile industry which once flourished is not found at present. Much of the trade of Calicut is carried on thru Bombay, but rice is imported directly from Burma and Bengal.

Near the northern limit of the division on the lagoon formed at the mouths of the Netravatis and Gurpur rivers is found the city of Mangalore. When viewed from the sea or from any point of vantage, it presents the appearance of a vast coconut plantation, broken only here by some church spire and there by some factory chimney. The busy bazaars are quite concealed from view. Within the city there are thirty-six tile and brick factories which obtain their clay from the nearby hills.[7] Mangalore is the terminus of the South Indian Railroad which connects the West Coast with Madras via Palghat Gap. As stated above, the railroad follows the coast as it extends southward, taking advantage of the slightly elevated land of the barrier beach.

[6] Population. 1901—75,510; 1911—78,417; 1921—82,334. Census of India 1921.
[7] Statistical Atlas of Madras. Madras 1924. Page 10.

II. THE MIXED PADDY AND VARKAS LANDS

Occupying an intermediate position between the Ghats on the east and the Barrier Beach Cocoanut Division and the Arabian Sea on the west is a part of the West Coast Region which presents diversity in both natural and cultural landscapes. However the uniformly high percentage of cultivated land devoted to the production of rice and the major relief features give sufficient unity to justify its being called a geographical division. See rice map, Fig. 7.

In traveling from north to south, a transition belt may be observed in the territory surrounding the Damanganga River.[8] North of the stream cotton, bajra,[9] jowar,[10] and wheat are the most important crops, but some rice and a few oil seeds may also be found. Southward, with the increase in rainfall, rice becomes predominant, occupying over 50 per cent of the cultivated land and with ragi[11] and fodder occupying an additional 30 per cent. Cotton, bajra, jowar and wheat become correspondingly less important and a short distance south of

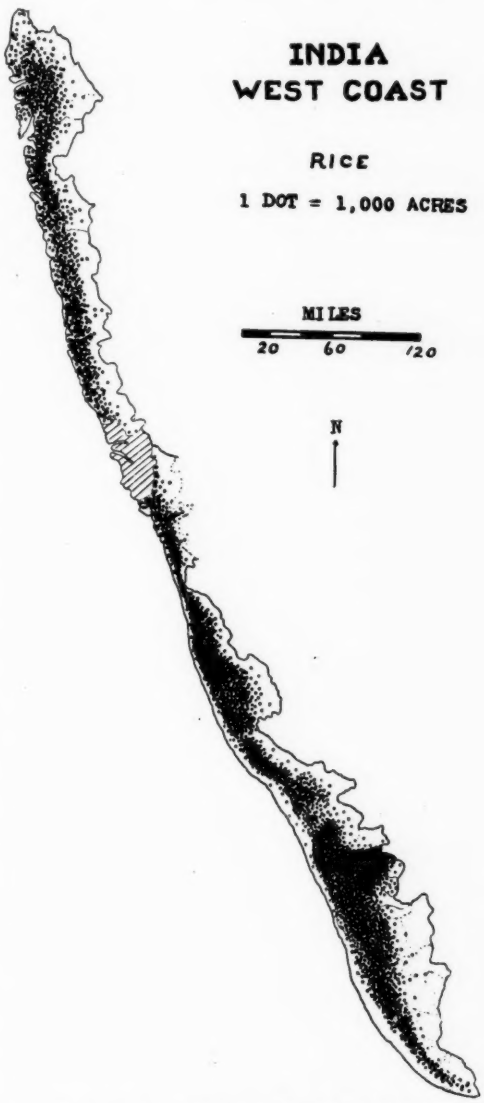


FIG. 7. Rice map of India West Coast.

[8] Th. T. Englebrecht. Die Feldfrutche Indiens in Ihrer Geographischen Berbrietung. Atlas. Hamburg, 1914. The data showing this transition was compiled from this atlas.

[9] A variety of millet.

[10] A grain sorghum.

[11] A variety of millet.

the Damanganga, their combined acreage constitutes less than 4 per cent of the cultivated land. Thus the Damanganga River becomes the northern boundary of the West Coast Region.

In the northern part of the Mixed Paddy and Varkas Land Division, a dissected tableland composed of trap rises abruptly above the sea to an elevation of two hundred fifty to five hundred feet. Spurs and outliers of crystaline rock and sandstone, usually forested, rise above the tableland increasing the relief about four hundred feet or more. Numerous streams have cut valleys of varying widths in the tableland and in these valleys rice is cultivated intensively. A small amount of rice is produced on top of the tableland and it depends entirely upon the heavy rains for sufficient water to mature the paddy. Southward the tableland of trap gives way to the even-crested ridges of crystalline rock with wider valleys and less steep slopes. A barrier beach shuts this southern unit away from the sea and thereby makes the streams more sluggish near their mouths with the result that more sediments are deposited near the lower end of the valleys than is found in the north.

Within the division, certain contrasting associations necessitate the making of sub-divisions; thus may be found, The Northern Rice and Millet Unit, and the Southern Rice, Tapioca and Spice Unit.

II A. The Northern Rice and Millet Unit

Southward from the mouth of the Damanganga River to the southern boundary of the Portuguese Territory of Goa, the coast gradually but continually becomes more bold, rockbound, and stern in appearance. Until the Harbor of Bombay is reached, sandy strips, capped with low dunes of shifting sand, are common. Southward from this harbor, a sea cliff of trap, rising several hundred feet above the water is the most outstanding characteristic of the coast. Where streams have cut their ways to the sea, low valleys add variety to the rock cliffed shoreline and provide bays on the otherwise regular littoral. These valleys vary in width from narrow gorges to broad open lowlands, a mile or two wide. At the outer part of the wide valleys the shore is low and sandy, with a row of sand dunes, about twenty or thirty feet high, overlooking the embayed section.

Since all of the ports are located at the mouths of the streams where there are more or less continuous strips of level land, the towns are invariably surrounded by coconut palms and the scene

is very picturesque. Therefore the traveler, stopping at the ports, sees many coconut palms and often has been led to conclude that coconut production is a major occupation in this unit. But the poleward limit of the palm is rapidly being approached as the northern boundary of the unit is reached with the result that fewer nuts per tree are produced than in the unit to the south. Also the absence of a continuous strip of level land greatly reduces the acreage available for coconut production. Coconut gardens occupy less than 2 per cent of the cultivated land[12] and in these gardens, many of the trees are tapped for the production of toddy and coarse sugar, thus eliminating those from nut production.

The largest and most important towns of the unit are located on the alluvium near the sea where the rivers have cut their way thru the tableland. Each is characteristically marked by the presence of an old fort on the cliff above, most of the forts are now in a state of ruin and decay. The rivers give access to the interior which is otherwise inaccessible except by the slow ox-cart. Roads are mostly poor or entirely lacking. The hinterland produces very little material for export and is a poor market for imports. Therefore the seaborne trade of the coastal towns is small and most of the exports are either from the immediate hinterland or from nearby waters. The coast south of Bombay Harbor has been submerged and a relatively wide continental shelf has been formed. The shallow waters are splendid feeding grounds for fish and fishing is one of the outstanding occupations of the people of the littoral. Bombay furnishes a market for fresh fish while the dried fish are sent to the Deccan.

Most of the coastal towns and villages are visited daily by small steamers except at the time of the southwest monsoon. See rainfall map, Fig. 8. These steamers provide the only means of communication for many of the coast towns, therefore during the stormy period of the southwest monsoon, the towns are practically isolated from the rest of the world. Even mail service is abandoned until fair weather. The numerous buoys and warnings which mark the places of danger along the coast are taken in during this season and it is almost impossible for a ship to anchor safely.

Manufacturing in the villages is important only locally, most of the important manufacturing being carried on in the city of Bombay. Before the development of power weaving, hand looms of

[12] Bombay Presidency, Department of Agriculture. Season and Crop report. 1926.

these villages were important but being unable to successfully compete with the power looms in Bombay City, they are becoming less and less important.

Where the alluvium reaches the coast, salt marshes are found just back of the sand dunes which form the outer shore. In a number of the marshes with their waterlogged saline mud, mangrove forests grow profusely. The high arched prop-roots lift the main stem of the tree above high tide, presenting an almost impenetrable tangle of roots and knees when the tide is out. Altho the tree provides lumber which is very resistant to decay, even in seawater, and the bark is valuable in tanning processes, yet the chief use of the trees in this unit is to provide fuel for the nearby towns, especially Bombay. Occasionally these marshes are sown with swamp rice.

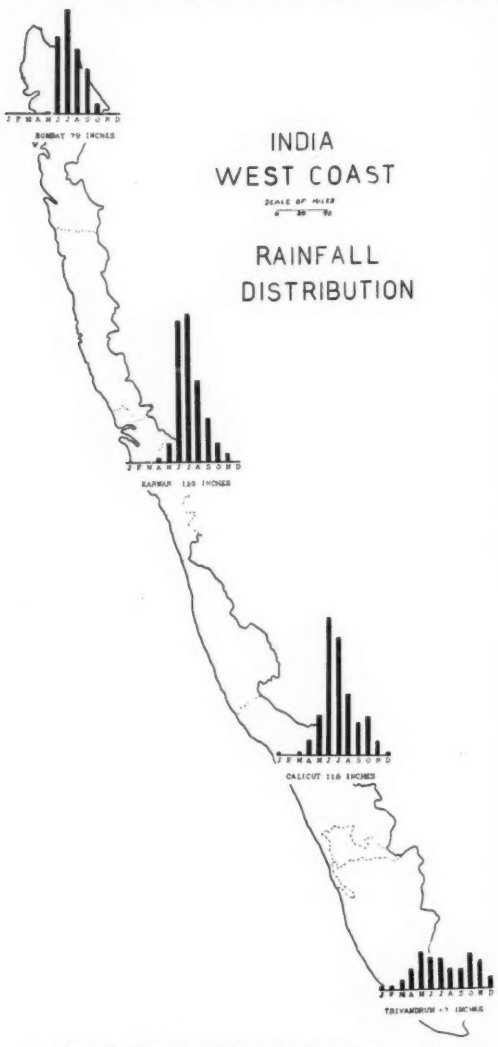


FIG. 8. Rainfall distribution by months at selected stations. The total annual precipitation is given after the name of the station. Source: Meteorological Report of India. Calcutta.

On the alluvial floors of the large valleys are found the most extensive areas of rice culture. The lower slopes of the valley walls are often terraced to give additional land for the production of that grain since this is a unit of little double cropping. Less than 5 per cent of the cultivated land is planted in a second crop[13] and in contrast to the unit to the south where rice is the second as well as the first crop, here the second plant-

[13] Season and Crop Report of Bombay Presidency. 1926. Compiled.

ing is ragi or some coarse millet. Paddy fields are carefully leveled and diked so that the heavy rains which accompany the monsoon may be fully utilized, thus saving the expense and trouble of irrigation. However streams are some times dammed so they will flood large areas of lowland rice.

Early in September the fields are drained and become dry for the harvest season which lasts from September until November. The grain is harvested with a sickle and it requires eight or ten days for a man and his wife to cut about four acres. A farm of average size, in this unit, is from four to six acres, usually in scattered plots. In general, an acre of rice produces from 1,000 to 3,000 pounds of grain annually.

Most of the land lies fallow until it is planted in rice the next year. However a small amount of the paddy land is planted in a second crop, chiefly ragi, which is harvested before time to prepare the ground for the rice crop the next year. The fact that ragi, not rice, is the characteristic second crop makes this northern unit stand out in bold contrast with the one to the south.

While rice occupies over half of the cultivated area and this unit produces about two-thirds of the rice grown in the whole Bombay Presidency, yet there is an insufficiency to feed the dense population which amounts to four hundred fifty per square mile of cultivated land.[14] Many of the natives are forced to depend on coarse millets and ragi, which are grown on the laterite soils of the tableland, for their chief food supply.

During the rainy season cattle may be seen grazing on the laterite slopes of the uplands which, at that season, have a sparse grass cover. During most of the year the tablelands are bare except where they carry a cover of bushes. After the rice is harvested from the alluvium, the cattle are allowed to graze on the rice stubble, trying to eek out an existence. One of the serious problems of the unit is to provide fodder for the cattle. There has been an effort made to introduce tame hay into the agricultural scheme but the season during which the conditions are best suited for hay making, so that the greatest amount of food is in the fodder, is short and weather conditions are variable. Thus the effort has met with only partial success.

In characterizing the conditions of the farmers of this unit, Mukerji says, "With ill-fed, ill-bred and famished cattle, with

[14] Data from Vol. 13, Census of India, 1921, and Season and Crop Report of the Bombay Presidency. 1926.

small, scattered uneconomical holdings, with bad varieties of seed and with no facilities for marketing, the ryot cannot make agriculture a paying business and always remains where he was.'"[15]

THE CITY OF BOMBAY

The outstanding industrial city of India and commercial center of the entire West Coast is Bombay. Its good natural harbor, fourteen miles long and five miles wide with docking facilities to care for the largest ships, its rail connections with the interior of the peninsula by means of two passes in the Ghats, and its proximity to Europe via the Suez Canal are all factors which have added to the importance of the city. The Island of Bombay, upon which the city is mostly concentrated consists of two roughly parallel ridges of trap with alluvial deposits between. The ridges extend southward as peninsulas and resemble the thumb and long index finger. See map of Bombay Fig. 9.

On the two peninsulas and the low land between, forming a crescent around the shallow waters of Back Bay, is the oldest part of the city. The insular nature of the city has limited its expansion outward and the ever increasing population has concentrated in a very conjested manner in parts of the city. However it has outgrown its island limits and is well spread over the adjoining mainland.

Within Bombay there are eighty-four cotton mills with over fifty-four thousand power looms and employing one hundred eighty thousand workers.[16] The grade of cloth made in these mills is poor and piece cloth is one of the most important imports of the harbor. The cotton mill section is on the east side of the island especially near Sewree (See Fig. 8, Number 5). Here have been built one hundred seventy-eight "godowns" or warehouses, each with a capacity of 7,500 bales of cotton. Provisions have been made for two hundred forty-one open air storage plots, affording accommodation for 1,142,000 more bales.[17] This section is near the wharf and has both water and rail connections.

Bombay has long been important as a cotton manufacturing city and as a port for shipping raw cotton. A possible explanation

[15] Panchanandas, Mukerji. The Cooperative Movement in India. Calcutta. 1923. Page 18.

[16] Henry F. James. Urban Geography of India. *Bulletin of the Geographical Society of Philadelphia.* Vol. 28. Pp. 101-123.

[17] *Ibid.*

of this may lie in the fact that Bombay is located adjacent to two passes in the Ghats which makes communication with the cotton area of the Deccan easy. The city was formerly handicapped in its industrial development by the lack of coal for fuel but this has been overcome by the introduction of hydroelectric power. The heavy rain on the nearby Ghats furnishes abundant water for

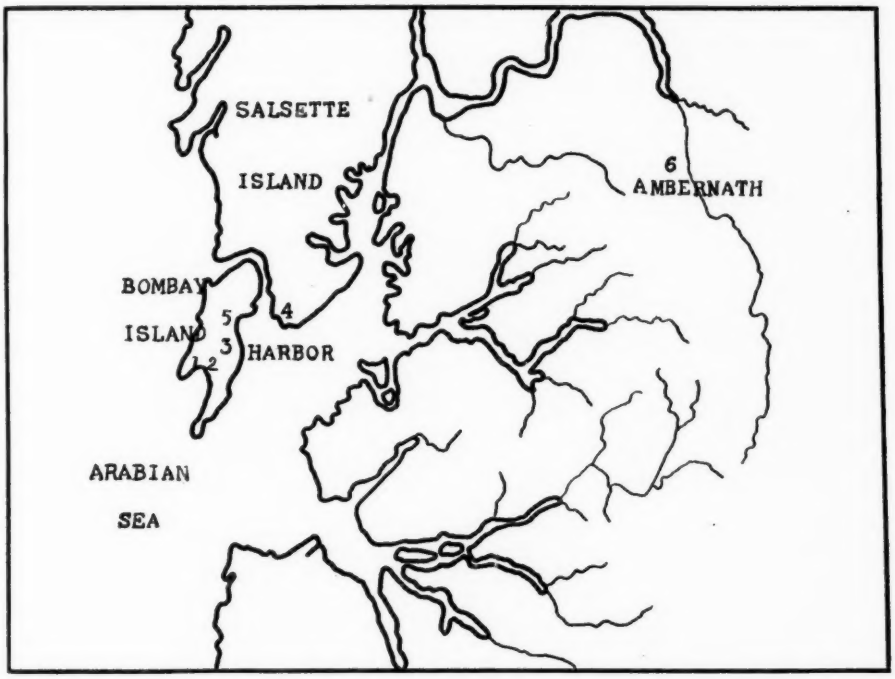


FIG. 9. Sketch Map of Bombay and Environs. 1. Malabar Hill, the exclusive residential section. 2. The section of Government Buildings. 3. Native quarters, a very congested section. 4. Trombay, where the tanneries are concentrated. 5. Sewree, the cotton mill section. 6. Ambernath, Bombay's new industrial center.

generating electricity. At present 102,600 kilowatts are generated, an amount equal to 77 per cent of the total hydroelectric power produced in India. Furthermore it is estimated that the potential undeveloped power, based on continuous flow, is 71,400 kilowatts.[18] The cotton mills are the greatest single consumer of this power.

Along the entire east side of the Island of Bombay is the port section of the city. From its earliest history the activities of Bombay have been centered about the harbor and even now it is one

[18] *Ibid.*

of the finest ports in the Orient. The value of the harbor is greatly enhanced by the fact that even at the height of the southwest monsoon quiet waters may be found here. In trade, the port ranks second only to Calcutta in the whole of India. Raw cotton is the chief export while cloth and machinery make up the most important imports.

II B. The Southern Rice, Tapioca, and Spice Unit

Southward from the Portuguese Territory of Goa to the end of the peninsula, the system of cropping as well as the crops differ somewhat from the unit just described. In addition, the annual range in temperature is less and the rainfall in the extreme southern part tends to be more evenly distributed. Extensive double cropping is practiced, usually in excess of 10 per cent of the cultivated land produces two or three crops annually. Here two crops of rice are often produced on those parts of the alluvial lands which are double cropped and tapioca and spices also play an important rôle in the agricultural scheme. The surface continues to be characterized by hard rock hills separated by fingers of alluvium which follow the valleys of the main rivers. The valleys unite near the shore to form a narrow belt of low flat alluvial land about five miles wide, which roughly parallels the coast but is shut away from the sea by a sandy littoral six to ten miles wide.

Where the slopes of the hills have been cleared for cultivation, they are terraced so that the land will be sufficiently level to hold water for the production of a coarse rice, "modan," which depends entirely upon the heavy rains for its water. The lower slopes are usually planted with orchards of coconut and other palms, plantain and jack-fruit trees, upon which the ubiquitous pepper vines climb. The bottoms of the valleys are leveled into paddy flats while the summits of the hills are in many places bare, especially in the north, and expose large surfaces of naked crystalline rock.

The "wet lands" or valley bottoms are devoted almost exclusively to the cultivation of paddy but occasionally vegetables are planted as a second crop near the towns and cities. This, however, is the exception rather than the rule. Two or three crops of paddy are produced annually. Many of the paddy fields are above the level of inundation by the streams and these fields are diked so as to hold the abundant rainfall.

The greatest rice producing region of the entire West Coast

is in the lowlands of the districts of North and South Kanara. In South Kanara over 80 per cent of the gross area cropped is devoted to rice[19] and no other place in the whole region produces rice for export. Southward, the percentage of cultivated land devoted to rice decreases and in Cochin and Travancore the demand is much in excess of the amount of rice produced. Travancore produces only 40 per cent of the rice needed for its population.[20] The smaller amount of rainfall and the more even distribution probably are in part responsible. Altho irrigation is not imperative in Travancore, yet many times the yields are reduced because of a lack of water. About 10 per cent of the rice needed in this state is imported from Bengal and Burma and for the other 50 per cent, tapioca is substituted for rice in the diet. Within the past few years, tapioca has been gaining favor because it may be produced more cheaply and with less trouble than paddy and also it gives fairly high returns, whether produced on the unirrigated laterite soils of the slopes and tops of the uplands or on the alluvial floors of the valleys. The cassava plant, from which tapioca is produced, is often used as a hedge around the gardens. Cattle are very fond of the central leaves and care must be taken to keep the plant protected. Cassava is not only used for human food but the leaves are used for fodder and the stalk for fuel.

Occupying an intermediate position between the fertile alluvial paddy fields on the valley floors and the sparsely covered grasslands of the hardrock hills will be found the houses of the cultivators. Altho called villages for administrative purposes, the homesteads are mostly isolated and each house, even the smallest, is in its own compound surrounded by trees and spice gardens. This is quite in contrast with the villages of the north. The ryots are self satisfied and it is their proud boast that everything except salt and tobacco may be produced on their farms.

The areal layout of most of the holdings shows great uniformity. Each ryot owns a small section of both alluvium and varkas land, altho often not contiguous. A row of areca palms generally surrounds the part of the farms that are on the slopes of the hard rock hills, and scattered over the upland area without any thought of pattern, are groves of jackfruit, mango and plantain trees. Coconut palms are also conspicuous thruout the gardens and in recent

[19] Data compiled from Season and Crop Report of the Madras Presidency. 1925-26.
[20] Census of India. 1921. Vol. 25. Part I. Page 80.

years have been competing with paddy for a place on the alluvial soils. The large trees support the parasitic vines which produce betel leaf and pepper grains, so highly prized by the Indians. Pepper is the most important spice produced along the West Coast and it, together with coconuts, compose the greatest source of income for the entire region. To secure adequate underdrainage and freedom from inundation, spice gardens are located on the slopes of the hard rock hills and are therefore eliminated from competition with rice for the alluvial soils. Beds of ginger and tumeric are found in the shady portions of the homesteads. Both crops grow well in shade and any soil that is not too stony will suffice for growing these plants. Where the trees are scattered so that the noonday sun strikes the earth, cereals and vegetables are grown. Near the center of the upland plot is the small thatched cottage of the ryot. "Under such conditions live the prosperous lotus-eaters, each family nestling under its own pepper vine and jack tree."[21]

The upper slopes are used for pasture. During the day the cattle are driven to the pasture and in the evening are brought back to the little homestead. Rice straw supplements the pasture during the dry season. In many places on the upper slopes clay deposits are found in sufficient quantities to warrant the manufacture of coarse brick. The clay is unsuited for the making of pottery. The brick factories are more or less evenly distributed over the entire unit and making of bricks is the chief form of industrial development.

Most of the lines of communication focus on the Palghat Pass in Malabar and follow the lower slopes of the hard rock hills. The low "wet lands" are avoided as much as possible by both roads and railways.

III. The Forested Slopes of the Ghats

The steep slopes of the Ghats are characterized by the forest cover, the sparse population which is mostly nomadic, larger holdings than elsewhere along the West Coast, and the exploitive type of industry. With the exception of rubber, coffee and tea plantations in the south, very little agriculture is carried on. Most of the tribes clear small spaces for some cultivation but depend upon the income from lumbering and the fruits of the forest to supply a large part of their food.

In the Ghats, both evergreen and deciduous forests are found.

[21] Census of India. 1921. Vol. 13. Part I. Page 23.

The lower slopes are the sites of the deciduous trees with teak and blackwood as the most common of this type. Altho teak is found growing extensively on the trap of the northern section of the division, yet it is most valuable for timber when found either on sandstone or old metamorphic rock such as gneisses and schists. When produced on alluvial soil, unless excellent drainage is provided, the tree becomes crooked and gnarled.

The trees are usually cut by the natives immediately following the summer rains and allowed to season before being sent to the mills. Because of their great density, the logs will not float when green and so seasoning is, therefore, a necessity. With the torrential rains of the southwest monsoon, the streams are swollen and then the large rafts of logs may be seen floating down to the seashore where the saw mills are located. Teak has been in great demand and the supply is decreasing rapidly.

On the higher slopes above the deciduous forests are the evergreens. Ebony is the most important evergreen and is especially valued for its very hard wood. The tree grows very slowly, requiring more than one hundred years to attain a diameter of one foot. Another evergreen which occupies even steeper slopes and more stony soil is sandlewood. It is seldom found below the thousand foot contour and is capable of growing at elevations above three thousand feet. The fragrance of sandlewood, a quality that improves with age, adds value to the lumber and to this characteristic more than any other, may be attributed its great demand. Attempts have been made to bring sandlewood under plantation cultivation on the fertile alluvial soil with the results that the growth is more rapid but the perfume qualities are deficient and hence the commercial value is reduced.

Plantation agriculture rapidly developed under European management in the southern part of the division with coffee, tea, and rubber as the most important crops, but the development seems to have stagnated. The rubber estates are characteristically located on the foothills and lower slopes of the Ghats while the coffee and tea plantations are on the higher slopes. In contrast with the small holdings so common in India, the plantations are large, varying in size from a few hundred to thousands of acres.[22] Coffee was the first to be developed but due to parasitic fungi and insect pests, the importance of this crop has declined greatly.

[22] Rudolph, Anstead. The Coffee Planting Industry in Southern India. *Agricultural Journal of India.* Vol. 14. Pp. 578-585. 1919. (P. 579).

When the parasitic diseases began to destroy the profits of coffee in the Nilgiris Hills, tea was substituted for coffee on the plantations. This practice continued and in 1922, tea occupied ninety-six thousand acres of the hill land compared with fifty thousand acres of coffee.[23] Over half of the tea acreage is in Travancore.[24] Unfortunately the tea bushes have been planted at right angles to the contour of the hills and erosion is very rapid. The tea is of poor quality and the leaves are mostly thick and soft.[25] Absence of a "resting period" such as is found in higher latitudes, also tend to make the tea of poor quality. Thus the tea plantations have not been the success it was hoped they would be.

The most recent development in plantation agriculture in Southern India is the establishment of rubber estates. The estates occupy the flat land in the upper parts of the valleys and the lower slopes of the Ghats. However the best plantations here produce only three hundred pounds per acre while the average production for Malaya is three hundred twenty-four pounds per acre and for the best estates it is twice that amount.[26] Therefore, "It is not anticipated that there will be any considerable extension of the present acreage."[27] During the dry season, tapping is practically abandoned and in the wet season, due to excessive rains at times, irregular care is taken in the collection of the sap with the result that the production is decreased.

The only definite break in the Ghats is at Palghat, a pass twenty-five miles wide where the culture of the plain is carried eastward into the Deccan. Railroads take advantage of the gateway and Madras, by means of rail connections, has extended its hinterland into the Coconut Barrier Beach Division of the West Coast Region. Movements are underway to improve the harbors on the western side of the peninsula and with their improvement it is evident that the hinterland of Madras will be greatly reduced and the commercial importance of the West Coast will improve, a condition which is already beginning to be felt.

[23] U. A. MacLaren. The Resources of the Empire. 1924. P. 142.

[24] Rudolph Anstead. The Planting Industries of Southern India. *Agricultural Journal of India.* Vol. 12. 1917. Pp. 413-418. (P. 415).

[25] Glenn Trewartha. The Tea Crop. *Journal of Geography.* Vol. 28. Pp. 1-25. (P. 7).

[26] D. M. Figart. The Plantation Rubber Industry in the Middle East. United States Department of Commerce. Trade promotion Series No. 2. 1925. P. 149.

[27] *Ibid.* P. 148.

THE EDUCATIONAL VALUE OF GEOGRAPHIC EXHIBITS FOR PUBLIC SCHOOLS

LAURA O'DAY
Buffalo Museum of Science
Buffalo, New York

The educational value of geographic loan exhibits for the public schools is dependent upon two chief factors: the selection of materials for the exhibit and guidance in the use of the materials. The service performed by each exhibit is, of course, affected by such factors as the length of the loan period, the method of distributing materials and the system of collecting them. These factors, however, pertain to the mechanics of operating a loan department rather than to the inherent educational value of the exhibit itself. Accordingly, they will not be considered here. I can best demonstrate the principles of selection and use of materials with a concrete example.

THE PURPOSE OF A SAMPLE EXHIBIT

My illustration will take the form of a set of museum materials designed to help guide the study of the cotton industry of the South. (Note: This material is presented at a fifth-grade level since that represents the medium of expression thru which the greatest number of children may be reached. The value of presenting material at this level is attested by the fact that it is customarily used by museums in the preparation of loan manuscripts.) The material in this sample exhibit has been selected to express certain ideas which will characterize the cotton industry. Cotton is the chief crop of the South. More land in the South is devoted to the cultivation of cotton than to any other plant. Cotton, moreover, brings more money to southern farmers than any other crop. In general, the purpose of the sample museum exhibit is twofold: (1) To show *how* many people of the South are fitting their lives to the natural environment. (2) To show *why* they earn their living in the way they have chosen. Specifically, the cotton exhibit aims to answer such questions as: Where cotton is raised in the United States; why cotton is grown in the places it is; how it is picked and prepared for market; where thread and cloth are manufactured from the cotton fiber.

SELECTION OF MATERIALS FOR THE EXHIBIT

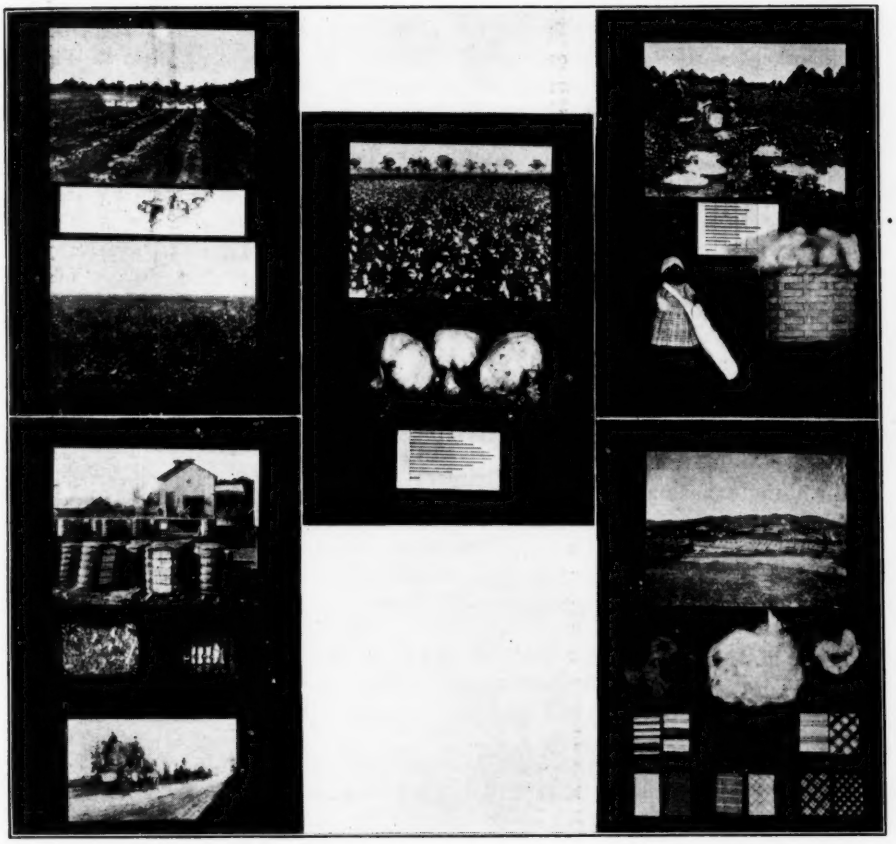
A first-hand study of the cotton industry would afford opportunity to investigate actual landscapes. This is impossible in the classroom and for practical purposes a substitution must be made. However, the geographer may still work with landscapes in the form of good, representative pictures. He may still familiarize himself with the products of an area in the specimens that are available in the collection of a museum. These pictures and objects, then, become the tools for geographic study. It is obvious that their selection for an exhibit is a matter of utmost importance.

In the first place, the choice must be inclusive enough to show all of the more important phases of activity in order that undue emphasis may not be placed upon single unimportant items. Accordingly, a set of museum materials is made up of separate charts, each representing some one phase of the subject to be studied. The set on cotton, shown in the accompanying figure, illustrates the plan. One chart has been designed to show the distribution of cotton and the appearance of the young plants in the field; another, to show a field of ripe cotton ready for harvest, samples of ripe cotton bolls, and monthly temperatures within the cotton-growing area; a third, cotton pickers harvesting the crop, the unginned cotton and, in miniature, a basket into which the contents of the pickers' bags are emptied; a fourth, ginned and baled cotton; and a fifth, a typical cotton textile mill with samples of cotton yarn and cloth.

Secondly, the natural environment which supplies the setting for the human element must be represented in the pictures as well as cultural features of the landscape. The pictures in the museum exhibit on cotton have been selected to represent the major divisions of a lesson on cotton. Each of the views selected is high in geographic quality since each represents both cultural and natural features of the landscape. The value of the pictures is increased by the presence of maps, grafs, and objects which are used as integral parts of the exhibit. To insure the coördinate use of pictures and objects, both are mounted on one chart.

TECHNIQUE OF GUIDING IN THE USE OF THE EXHIBIT

The service performed by this set of museum materials is closely related to the use that is made of it. A pupil may be guided



Sample charts in a set of museum materials designed to help teach a geography lesson on cotton. Pictures supplement the use of objects and both pictures and objects appear together on the charts. Photo by B. O. Doelman, Buffalo, New York. Courtesy of Publishers' Photo Service, New York; Asheville Photo Service, Asheville, N.C.; U. S. Department of Agriculture, Bureau of Agricultural Economics; North Carolina Cotton Growers' Coöperative Association, Raleigh, N.C.

by questions and directions to think geographically and to find for himself the solutions to questions raised in his mind. The following exercises are typical of those which constitute the manuscript on cotton:

1. Each of the black dots on the map on Chart 1 stands for 10,000 acres of cotton land. The pictures on Chart I were taken within this area of black dots and show you what the great fields of cotton look like in the spring. In what part of the United States does the map show you cotton is grown? Why is so little cotton raised outside of the area of black dots? As you study more about cotton, check your answer to see if you were right.

2. At least six months of warm, sunshiny weather are needed to ripen the cotton

"bolls" as the fruit of the cotton plant is called. Cotton is planted in March or April. It begins to bloom in June or July and the cotton bolls begin to ripen in late summer. They continue to ripen until frost comes. Each of the heavy black bars in Fig. 2 on Chart 2 represents the temperature of a city within the area of cotton production. How warm does the graf show you it is during the six-month growing season? Do you now see one reason why cotton is not grown farther north than it is?

3. Do the pictures which show cotton fields suggest that there is much or little rain within the area of cotton production? Why? The graf on Chart 3 gives the average rainfall in inches for each month of the growing season. Add these figures to find the average yearly rainfall for the area. Then from a rainfall map in your geography book find the average yearly rainfall beyond the western margin of the cotton-growing area. Do you see why cotton is not generally grown farther west than it is? Why?

4. Altho the cotton plant needs rain while it is growing, much rain during the harvest period would spoil the soft fiber of the plant. How much rain falls during the picking months of September, October, and November? (See graf on Chart 3.) Do you think that the rain comes at the best time for growing and harvesting cotton in the South?

5. All the cotton bolls do not ripen at the same time. New blossoms and bolls appear together on the plant until frost comes. This means that more than one picking is necessary to harvest the cotton crop. The picking is all done by hand and it is such slow work that one good worker can harvest only about 300 pounds of cotton a day. What does this tell you about the number of pickers needed to harvest a cotton crop?

The cotton is picked into large bags and emptied later into big baskets like the small one on the museum chart. Examine some of the cotton as it comes from the plant. What do you find besides the soft, white fiber? Seeds make up about two-thirds of the weight of the cotton when it is picked, so you see that 300 pounds of cotton is not as much as you thought at first.

6. The seeds have to be separated from the cotton fiber before the fiber can be made into cloth. Do you think it would be easy to remove the seeds from the fiber by hand? Before the invention of a machine called the cotton gin all seeds had to be removed by hand. Now the cotton gin removes many more seeds in a short time than a man could remove in a whole day. This is done at a gin house such as you see in the picture on Chart 4. How do they haul the cotton from the field to the gin house? After the seeds have been removed from the cotton fiber, the lint is pressed into a large package called a bale. Examine carefully the sample of lint on Chart 5. Do you think much of this material could be pressed together into a small space? From the small sample bale on Chart 5 can you tell what is used to cover the lint? What is used to bind the bale? Does the careful preparation of each bale lead you to think the cotton is to be sent a great distance?

SUMMARY OF OBJECTIVES

The educational value of an exhibit of this type becomes more apparent when we summarize its objectives and review the particular devices employed in each instance.

From the study of the exhibit on the cotton industry of the South a pupil may obtain initial concepts of fact concerned with the geography of the area. Such concepts may be gained because

pictures of a particular kind have been chosen. Each of the views in this museum set is high in geographic quality since each shows man or some phase of man's work in its natural setting. In some of the pictures the relationship between the human element and the natural element is readily discernible. In others there is only a suggested relationship which needs investigation and checking. In still others no relationship can be detected at all.

The absence of a discernible relationship in museum materials functions to raise a question in the mind of the pupil and to motivate the reading he does in his text or library. Indeed, the first type of picture, the type from which relationships may easily be read, serves likewise to give increased pleasure to his reading because of the association he has made between that reading and the pictures. In the second case, as well, there is close correlation between his reading and study of the museum exhibit for the pupil must hunt in his reading to check the tentative conclusions drawn.

Aside from the actual facts pertaining to the study of cotton, the pupil will have gained something less tangible from his study of this exhibit. Such an exhibit gives practice in landscape reading and contributes in this way to the pupil's ability to select whatever cultural features may be present in the landscape and to turn almost automatically to the natural items for help in explaining them. Attention is guided first to the cultural items and secondly to the natural items. Every direction which is given has the dual purpose of helping him discover new facts concerning the lesson at hand and at the same time to rely more completely upon himself in reading those facts out of the exhibit.

Furthermore, the interest of the pupil is captivated by the puzzle element of the exhibit which challenges him to do his own thinking. Children from ten to fifteen years of age in the museum classes which the writer has conducted have always been eager to study a lesson which stimulated them to do their own thinking. The set of museum materials on cotton presents two distinct challenges: (1) The pupil must recognize for himself the various items shown in the pictures and mounted on the charts for they are unaccompanied by captions or printed explanatory matter other than the manuscript. (2) The pupil must establish the relationship between cultural and natural features of the landscape.

A Comparison of Attainments

In general, museums are at the present time following one of two plans in their loan departments: Either they are sending material out with no guide for its use or they are sending out printed explanatory or descriptive matter with exhibits. In both instances the entire problem of using the material effectively is left to the teacher. The exhibits prepared at Buffalo have been designed to meet the problem encountered by many teachers of just what to do with the material they borrow.

Even without objective data upon which to base an estimate of the effectiveness of exhibits of the type here discussed, it is obvious that marked differences in results must occur. When provision is made for greater pupil activity in the use of exhibits and concrete suggestions in the form of demonstration lessons are placed before teachers, new possibilities for using visual materials will be found. It will become apparent that a set of materials can supply its own motivation and still adapt itself to the plans of the teacher who understands how to use it.

Finally, it is well to remember thruout that much of the information customarily sent out with museum exhibits is already available to the pupil in the library. More can be discovered from lantern slides or the pictures and objects making up an exhibit if directions are carefully formulated. Museum exhibits in geography should stimulate the pupil's interest and lead him to investigate the varied sources of information at his disposal.

THE DEVELOPMENT OF THE TUNG OIL INDUSTRY IN FLORIDA

W. T. HICKS
University of Florida

The growing of tung-oil trees, an oriental industry for centuries, has gained a foothold in Florida within a period of less than ten years. For many years, China's monopoly on production of tung oil appeared impregnable, but since 1923 Florida has jumped from an uninterested experimenter with tung-oil trees to a probable serious competitor of China's monopoly. Not better climatic con-

FIG. 1. Young tung-oil trees in grove formation. One year after planting. Extensive plantings are being made every year in Alachua and adjoining counties. Courtesy B. F. Williamson.

ditions, but superior methods give to Florida certain economic advantages in the production of this commodity.

Tung oil, often called China wood oil, is obtained by pressing or crushing the nut of the tung-oil tree. The oil thus secured is valuable to the paint and varnish industry because of its superior drying qualities over that of similar oils. The nut of the tung-oil tree reaches a diameter of from two to three inches and resembles a small apple in shape. The nut, which is surrounded by a thick husk, usually contains five or more seed. The seed are shaped somewhat like a castor bean, the meat being white and very oily.

Tung oil was first introduced on the United States market in

1869, but only since 1905 has the use of tung oil reached an appreciable figure in this country. The United States imports yearly between $10,000,000 and $15,000,000 worth of tung oil, chiefly from China. In 1929, tung oil ranked as the third most important chemical import into this country from the standpoint of value.

CLIMATIC REQUIREMENTS

The tung oil district of China is between the 23d and 32d parallels. The tree is a sub-tropical plant and is easily killed back by

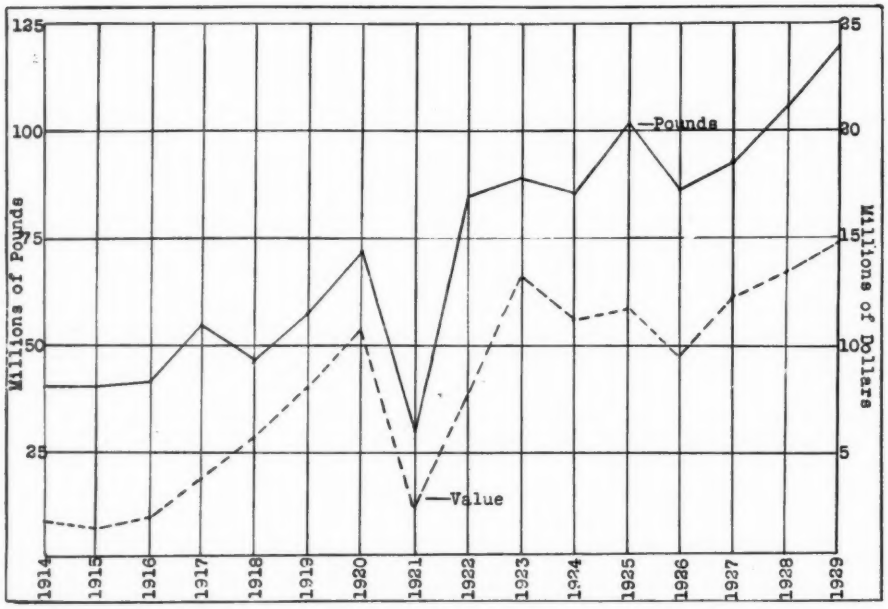


FIG. 2. Imports of tung oil into the United States. Imports have steadily increased since 1914. Data from U. S. Department of Commerce.

cold when in active growth. Young trees are severely hurt when the temperature drops below 18° or 20° F., but old, mature trees will stand somewhat lower temperatures without serious damage. A late frost will kill the bloom, which is an additional factor that limits the trees to southern latitudes.

The region in Florida best suited to the tree is the central and north central part of the state. Trees in the extreme northern part of the state have, on occasion, suffered damage from cold while trees in Alachua County, in the central part of the state, were not hurt. The larger commercial plantings have been made chiefly in Alachua and adjoining counties.

SOILS

The trees grow chiefly in clay sand soils in China, a type of soil found in many parts of the southern United States. However, experiments in Florida have shown that the tung-oil tree can adapt itself to a variety of soils, altho it does not thrive well in a lime or phosphatic limestone soil. As with most tree crops, good drainage is essential.

EXPERIMENTAL WORK IN THE UNITED STATES

The first tung-oil seed were brought to this country by the United States Department of Agriculture in 1905, and were planted in California. Trial plantings were also made in Florida in 1906. Scattered plantings were made in various parts of Florida, chiefly around Tallahassee, until 3,000 trees were growing in the state in 1920. The first commercial planting was made in 1923, and by the end of that year the number of trees within the state had been increased to 14,000. A steady increase in plantings since this time has given Florida approximately 600,000 trees in grove formation, covering 6,000 acres, in 1930, with indications of still greater plantings in 1931 (See Fig. 4).

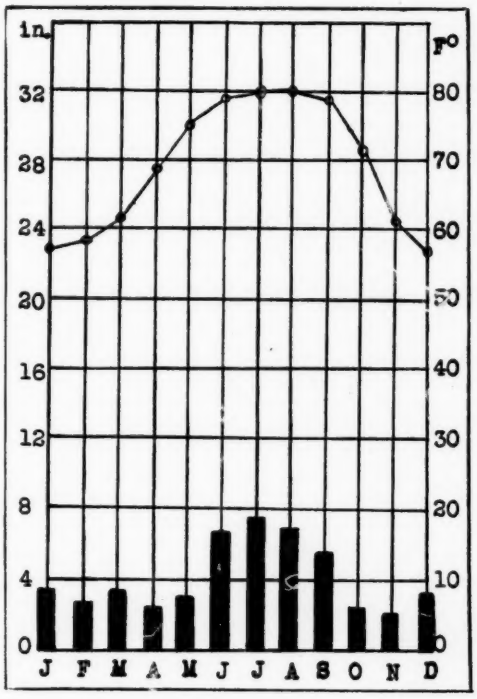


FIG. 3. Temperature and rainfall chart of Gainesville, Florida (Elevation 176 feet). Total rainfall for year averages 49.11 inches. Gainesville climate is similar to that of the tung oil region of China.

Plantings have also been made in all of the extreme southern states, including Georgia, Alabama, Mississippi, Louisiana, Texas, North and South Carolina. Results obtained from these plantings have shown that Florida possesses advantages over all of the other states and is the only state in which commercial plantings have been made to a noticeable extent.

It is estimated that less than 500 acres of trees have been planted in all of the other states.

USES

Tung oil takes the place of linseed oil in much of our waterproof varnishes and paint liquids because of superior drying qualities. Varnishes made with tung oil compare favorably with those made from such gums as Kauri, Manila, Zanzibar, etc., which are steadily rising in price. Practically all of the spar varnishes are now made with tung oil. It is also used for waterproofing cloth, linoleum, oil cloth, paper, and many kinds of masonry and woodwork, as well as in the insulating compounds of motors, dynamos, cables, brake bands, cartridges, and similar articles. A considerable amount is also used for enamel coatings on tubes containing cosmetics, shaving creams, and substances of this kind.

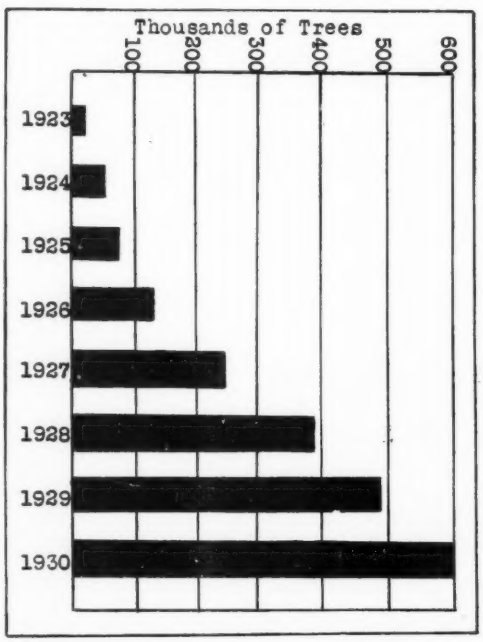


FIG. 4. Tung-oil trees growing in Florida. A rapid increase in plantings has taken place since 1923, and indications are that plantings will continue to increase rapidly.

Chemical analyses of the residue left after the oil is extracted from the nuts show that it is a valuable fertilizer.

China has used this oil for centuries, the chief use being as a waterproof covering for wood. Considerable amounts are used for oiling and calking the Chinese junks. Houses, furniture, and similar articles are protected with tung oil. In fact, the name of "wood oil," as tung oil is sometimes called, originated from its numerous uses in connection with wood. Thruout most parts of China this is still the principal paint oil. Cloth, paper, and silk are likewise made waterproof with it. Soap, a type of India ink, and certain other articles of this nature are also made from tung oil.

AMERICAN METHOD VERSUS CHINESE METHODS

Harvesting. The nuts fall to the ground when mature, where they may lie for several weeks without deteriorating. The nuts generally fall in October and November, and may be picked up by the farm labor whenever convenient. Most of the labor in Florida, of course, is Negro.

In China the nuts are generally harvested before mature, poles being used to knock them off the trees. The nuts are then gathered into piles and often left to ferment so that the husk will come off easily. The immature harvesting and fermentation lower the quality of the oil.

Decortation and Pressing. In China the husks are removed entirely by hand. Two methods are used of loosening the husks to facilitate removal. One is to allow the nuts to ferment by first heaping them in large piles and allowing to heat. The other method is to

FIG. 5. A large tung-oil tree growing on the grounds of the Florida Agricultural Experiment Station, Gainesville. The tree in the foreground is 28 feet high with a spread of 37 feet. Courtesy B. F. Williamson.

drop the nuts in hot water. Both of these methods loosen the husks so that they can be removed without great difficulty by hand.

After the husks have been removed, the Chinese crack the seed by hand methods and heat them in open pans. The nuts must also be thoroly dried. After the nuts have been heated and dried, they

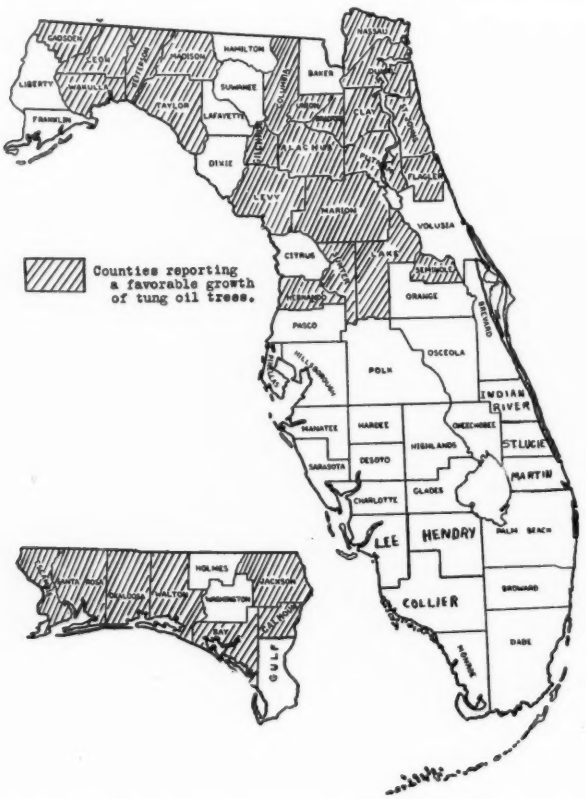


FIG. 6. Map of Florida showing counties reporting favorable growth of tung-oil trees. Chief plantings are concentrated in Alachua and adjoining counties. Data from Florida Experiment Station Bulletin 221.

are placed in small sacks. The nuts are then ready for pressing. The usual method is to place the sacks in a cavity made out of a large log. First a sack of nuts is placed in the cavity, followed by a flat stone placed next, which in turn is followed by another sack of meat and another stone. This procedure is continued until the cavity is filled. Each cavity is usually about twenty-five to thirty inches long and twelve inches wide. After the cavity has been filled, wedges are driven in to exert the pressure necessary to remove the oil.

The method adopted in Florida is to have the oil extracted entirely by machinery. The unhusked nut is dropped into the machine as it is brought from the field, and there it is hulled and the oil pressed out without further handling. The machine extracts all but 5 per cent to 6 per cent of the oil, whereas the Chinese methods leave from 18 per cent to 22 per cent of oil in the residue. The method of extracting the oil in China also causes it to contain from

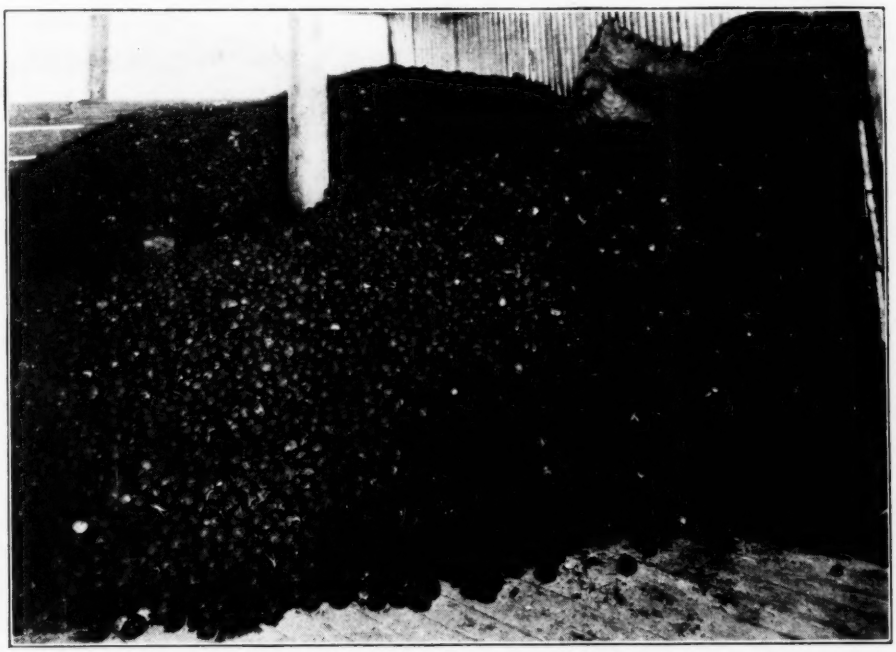


FIG. 7. Tung oil fruit ready for the crushing plant. This shows the fruit as it looks when brought in from the field. It may lie under shelter several months without deteriorating. Courtesy B. F. Williamson.

5 per cent to 8 per cent free acid and to become dark in color. The machine product is much clearer and purer, and does not contain the free acid.

Plant Breeding. The Chinese have made no effort to improve their product or to select higher yielding trees. As a result, the yield per tree in China has remained practically stationary for centuries. All of the Florida trees so far have been seedlings, but by careful selection of high yielding trees, the Florida Experiment Station has materially increased the yield per tree within a period of only a few years. There is no doubt but that the yield can be materially increased by careful selection.

Cultivation and Fertilization. Neither have the Chinese made any effort to cultivate or fertilize the tree on a scientific basis. Experiments in Florida have shown that the tree responds very favorably to the right cultivation; tractors are being used for cultivation in the majority of groves. Fertilization has also increased the yield materially; in fact, to such an extent that the use of commercial fertilizers is judged profitable. The value of legume cover crops has likewise been definitely established. As more facts are discov-

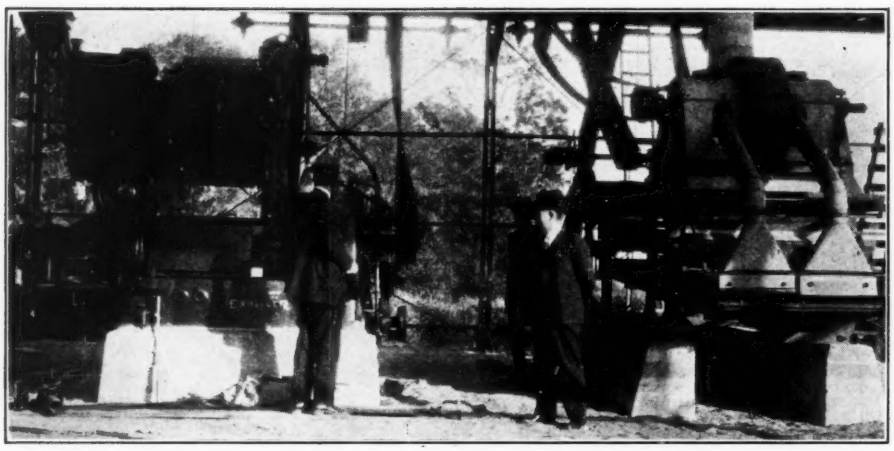


FIG. 8. Modern tung oil crushing plant on the grove shown in Fig. 7. The fruit is poured into the huller shown at the right, where the outside husk is removed from the seed. The seeds are then transferred to the pressing machine shown on the left, which extracts the oil.

ered regarding cultivation and fertilization, Florida will be able to correspondingly reduce cost of production.

HANDICAPS IN CHINA

Unstable political conditions in China make it unprofitable to put large investments in capital in the rural sections. This, together with the fact that the prejudice against machines is strong in a large part of interior China, makes it unlikely that any change in methods of production will be brought about there within the near future. The unstable political conditions have likewise made the supply of oil uncertain, resulting in fluctuating prices.

Another undesirable practice of the Chinese is that of adulterating the oil before it reaches exporting centers. Even tho adulteration greatly reduces the price received for the oil, it is stated that a large percentage of the oil is adulterated with tea oil, sesame oil, peanut oil, and even tallow, before it is exported.

Most of China's production comes from the western provinces and is exported thru Hankow. The oil is therefore transported down the Yangtze River to Hankow. Many difficulties face the junks during this journey. Some boats are wrecked on the rapids of the river, while others are attacked by pirates. The numerous tolls and taxes imposed at various stages of the journey add to the difficulties.

THE OUTLOOK OF THE INDUSTRY

Florida can produce tung oil cheaper than China only because of more efficient methods. Scientific plant breeding is giving a higher-yielding tree, and the substitution of machinery for hand labor is cheaper and turns out a better product. Unstable political conditions in China and the prejudice against machinery make it improbable that China will improve its production in the near future. The expansion of the industry in Florida seems to be fairly certain, and indications are that plantings will continue at a greatly increased rate within the state for the next few years at least.

A EUROPEAN FAIR

EMILY V. BAKER
State Teachers College, Valley City, North Dakota

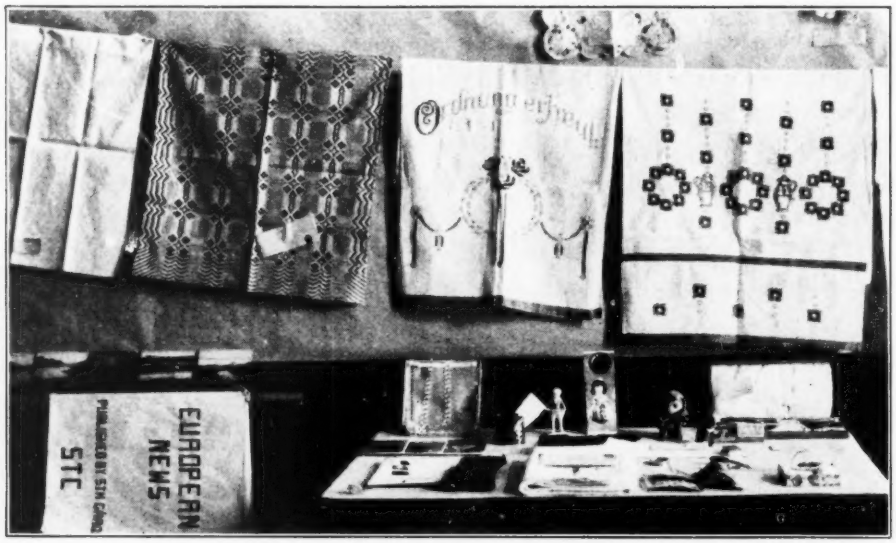
"I think our visitors enjoyed our fair as much as we did" is a fifth grade pupil's appraisal of an activity designed to stimulate interest in the study of Europe. Europe, because of its many divisions—both political and geographic—presents a formidable aspect to the pupils of the intermediate grades unless the children can see each region as the home of boys and girls whose fathers and mothers are working in home, field, factory, mine or forest, in order to buy them food, clothes, and books.

SETTING A PROBLEM FOR THE STUDY OF EUROPE

In order to help the children see at the outset the necessity for the more intensive use of the resources of Europe than of our own at present, we compared the relative density of population of Europe and United States and of certain European countries, such as Belgium and France, in which the size of the farms ranges from two to fifteen acres, with North Dakota, in which the farms commonly range in size from two hundred to one thousand acres. To children in North Dakota the contrast constituted such a revelation that the problem, "How do the people of Belgium and

France make a living?'' came as a perfectly natural question. This query led to a study of the methods of procuring large yields from small areas. Thru efforts to solve this problem the children acquired a respect for their distant friends and, at the same time, acquired the conception that in areas of dense population people must use their resources economically.

In anticipation of the fact that the articles which the children



A SECTION TYPICAL OF THE DISPLAY

Left to right. Hanging. Upper row. Hand-embroidered handkerchief from Switzerland. Dolls made of yarn, from Germany.

Second row. Two hand-woven lunch cloths from Sweden. Two roller towel covers from Germany.

On the table. Back row. Crystal beads from Interlachen, Switzerland. Swiss cowbell. Toys from Germany. Box of silverware from Germany.

Front row. Souvenir menu from an ocean liner bearing examples of foreign writing and printing. Woolen stockings from Switzerland. Tablecloth and letter from Germany. German paper money. In the box, a small piece of Dresden china.

would bring to the fair would reveal, in all probability, a preponderance of handwork, the children were led to see that in all densely settled regions human labor is less well rewarded in a monetary way than in United States and that, therefore, many of the people of Europe do much work in the field by hand while others acquire great skill in working with wood, metal, and fiber.

STRESSING GEOGRAPHIC RELATIONSHIPS

The first division to be studied was the British Isles. While traveling thru Great Britain one of the boys found at home a mus-

tard can bearing a British label, and a little girl found a plate which had been brought from England. With these as an impetus the children were encouraged to bring whatever they could find which had come from the countries they were studying. As the articles came in, they were discussed in connection with the land from which they came. For example, the geographic factors favoring linen production in Ireland were considered. When the Scandinavian countries were studied, the children brought wooden cheese boxes, a wooden sandwich basket, a beautifully carved Viking drinking cup, and boxes of matches. To hear the boys and girls tell why the Scandinavians make many articles of wood and why we found many cheese boxes among our Scandinavian friends would delight the ears of those interested in helping children to see the geographic factors underlying the simplest forms of human behavior.

A Norwegian newspaper from which one of the teachers read to the pupils, letters from Norway, Germany, and France, paper money whose characters we could not interpret, a towel cover bearing the German motto, "Ordnung erfreut," (Order brings happiness), and souvenir menus, theater tickets, street-car tickets, and cards from Austria, Spain, and Italy made real to the children the difficulties people meet in traveling and trading in this continent of many countries. From such concrete evidence it was possible to lead the pupils to see in the physical features of Europe reasons for the many small divisions in which the people speak a common language.

THE SUMMARIZING ACTIVITY—THE FAIR

When the class had studied each of the regions with our major problem and suitable minor problems before them and had completed their collection, the most interesting pupil activities of the entire unit were begun as a review exercise. The program of review was discussed with the children. They decided to elect a "setting up committee" whose duty it was to cover the tables and blackboards with white paper. This committee also sorted the articles brought, as far as possible, into groups according to countries represented. Thru our measures of precaution we hoped the boys and girls would be led to realize the greater-than-money value of many of the articles lent and to feel a genuine appreciation of the spirit of coöperation manifested by every one from whom we had requested help in making the fair a success.

Altho the exhibit was to be open to everyone in the school and to

the parents, the pupils felt that the people who had lent us articles for the fair and the other classes in geography should have written invitations. Accordingly, in addition to making posters to place in the hall, during the English class the children wrote invitations to those they decided should receive this special honor.

The class agreed that the fair should be open to everyone for a short time before school, during the geography period, and for thirty minutes after school. To the geography classes and the parents the fair was open at any hour of the school day for two days.

When the children realized that visitors would be coming, they decided to elect guides to conduct their friends thru Europe. The work of interpreting the results of their efforts to teachers and students from other departments, to classes of third, fourth, sixth seventh, and eighth grade pupils, and to their parents, gave the children the greatest pleasure, and, at the same time, did more than any other phase of the work to force upon the pupils the need for clear thinking. Happily, we had so many visitors that at one time or another each of the pupils shared in the joy of being a guide.

EVALUATING THE ACTIVITY

Altho no attempt was made to evaluate this activity objectively, the enthusiasm manifested by the participants in the geography class constituted sufficient evidence of its worth. But in addition to feeling the interest in geography quickened, the teachers enjoyed the satisfaction of seeing the children work together in planning and executing a project successfully. The boys and girls received training in working in committees, in approaching different members of the school and community with requests, in handling borrowed property with care, and in extending expressions of appreciation later. Besides possessing these socializing values, the fair afforded the children an excellent opportunity for linking cause and effect in explaining to their visitors, in their elementary way, the geographic basis of various forms of human conduct. The children took pride in exhibiting the áll-fiber shoes worn by the Spanish laborers, in offering reasons for the Germans sending us toys, and in accounting for the marvelous skill manifested in the collection of handwork in fiber, china, wood, and metal. The children handled cards, silverware, dishes, table linen, shawls, handkerchiefs, beads, toys, money, shoes, and caps which brought their own messages from children across the sea to the imaginative minds of our children. "And the thoughts of youth are long, long thoughts."

ROBERT DeCOURCY WARD

1867-1931

Any mere statement of Robert DeCourcy Ward's contributions to the sciences of meteorology and climatology—great as they are—would not be an adequate appreciation of him or his work, for he was so versatile, so human and so idealistic that he gave of himself wherever his service would be helpful. Perhaps his greatest contribution—and it cannot be measured—came through his many years' service as one of the Administrative Board that was advisory to the Dean of Harvard College, and later as chairman of the Board of Freshmen Advisors. Through these services, and through his teaching, he touched the lives of many young men who found in him a sympathetic understanding, a fairness to the individuals, a loyalty to his ideals and his college, and a humanness that are indeed rare. He won more than the respect, he won the confidence and affection of the youth who came to know him best. The same interest in humanity prompted Ward in his early manhood to become one of the founders of the Immigration Restriction League, an interest he followed through life.

Ward found Climatology an infant among the sciences, little known in this country, and he made it a strong and indispensable subject. His translation of Hahn's Climatology nearly thirty years ago, first made the essential factors of climate available in usable form in this country. His own books, his reports of exploration and research, and many minor contributions, made Ward universally recognized as our leader in the field of Climatology, as was evidenced by honorary membership in several learned societies, and by his being elected President of the Association of American Geographers and later of the American Meteorological Society.

His desire to serve others and to promote an understanding of his subject prompted Ward to found and conduct for several years the American Meteorological Journal and later to be for another five years an Associate Editor of the predecessor of this JOURNAL, to all of which he contributed many valuable articles that are equally helpful and pertinent today.

Ward's influence has spread into the classrooms from elementary school to the university, as well as into the homes of the country. He was a great teacher because he had an ability to seek knowledge and to impart it in a simple and clear manner—but above all because of his personal qualities that were so enriched and deepened in his long life of service.

RICHARD E. DODGE

GEOGRAPHICAL PUBLICATIONS

Blanchard, W. O., and Visher, S. S. **Economic Geography of Europe.** 507 pages. McGraw-Hill Book Co., Inc. New York. 1931

The instructor who has to teach the geography of Europe will welcome this new book by Blanchard and Visher entitled the "Economic Geography of Europe." It is a worthy addition to the publisher's list of college texts.

The book is divided into two parts; the first, consisting of ten chapters, treats the continent as a whole. This portion was written entirely by Professor Visher, who has discussed briefly and concisely the natural environment and the general aspects of the economic and other human problems. One chapter is devoted to the "Distribution of Population and Cities," another to the "Distribution of Manufacturing," and this first portion is concluded by a discussion of the "Political Geography of Europe." Nearly a third of the text is devoted to Europe as a continent. The reviewer is of the opinion that much of the material in these general chapters could have been introduced in the later chapters, thus giving greater geographic quality to the text as a whole. These general chapters are necessary if the text is to be used in classes which have had little preparation, but when students have had a survey course in which the general aspects have been covered there may be some unnecessary repetition.

The second part, consisting of a single chapter on each of the principal political units and groups of states, was written chiefly by Professor Blanchard, tho Professor Visher wrote the sections on Belgium, the Netherlands, Russia, Spain and Portugal. The individual countries are grouped under major divisions of the continent. The arrangement of the chapters may be described as traditional, for the first chapter in Part II deals with the British Isles. The Netherlands and Belgium are treated together, as is usually the case, the Baltic countries including Finland are covered in a single chapter, and similarly Spain and Portugal are discussed in the first chapter on the Mediterranean countries. This second portion of the book is concluded with a chapter on "Mediterranean Asia and Africa." This final chapter covers those portions of the two continents which have vitally affected the historical development of the continent of Europe.

This first American text on the geography of Europe may be regarded as an important contribution to the teaching of geography. The numerous diagrams, maps, and pictures illuminate the text and make it very attractive to the student. The pie-diagrams and the bar-diagrams in general cover very recent years, but naturally do not include in most cases data for the period since 1929. It appears that the manuscript was finished at about the time of the beginning of the period of economic readjustment. Therefore, it will be necessary for the teacher to supplement the text in places with more recent data.

The text is essentially factual. The expression of opinion has little place in a text-book on the geography of Europe, and the authors have avoided the controversial political questions.

A. K. Lobeck's "Physiographic Diagram of Europe" has been included in the pocket of the cover, and should prove of great value to the student, for many of the regions discussed by the authors are nicely delineated on the map.

The professional geographers should be grateful for this new book in which a great quantity of pertinent information has been brought together, well organized, and presented in a readable style. It is obvious that the authors and the editors have made an effort to use the modern place names, inserting in parentheses the old name or English equivalent. This single feature is a very commendable characteristic of the book.

GUY-HAROLD SMITH

Ohio State University

Boris P. Torgasheff. **The Mineral Industry of the Far East.** 512 pp., 322 tables, 14 maps, bibliography. The Chali Company, Shanghai (6 Kiukiang Road), China. 1930

In these days of unrest in the Near West, any contribution to our understanding of the environmental factors is worth while. In this volume, Torgasheff has presented a comprehensive survey of the reserves and production of the minerals of eastern Asia.

The author was formerly Commercial Attaché of the Inperial Russian Legation in Peking and has lived in various parts of the Far East for many years. The book is written from the standpoint of an economist rather than a geologist, but many of the conclusions will be of interest to geographers. For the most part the information has been gathered directly from government agencies and private operators, and has been carefully checked. In a few places, however, Torgasheff introduces estimates of his own which are usually somewhat more optimistic than the official figures.

The volume contains more than 300 statistical tables which present information concerning production, trade, and reserves for about 60 mineral products. In most cases these are brought up to 1927. Eight areas are considered, including China and Manchuria, Japan with Korea and Formosa, the Russian Far East, the Philippines, and Indo-China. There is also an extensive survey of the world's mineral market.

The volume is divided into five sections. The first of these deals with the various areas, for each of which there are detailed tables of production together with an analysis of the probable reserves. Altho the Japanese Empire is probably the poorest of the countries around the western margin of the Pacific with respect to the value of its mineral wealth, it nevertheless leads the Far East in the value of mineral production per square mile with an annual average of more than $2,000 as compared with $1,660 for the United States and $200 for China. Such a high valuation per square mile as this merely reflects Japan's urgent need for raw materials. In terms of per-capita production, the yield in Japan amounts to $4.00 per person as compared to the Russian Far East with $16.00 and China with $.85. The similar figure for the United States is $50. Torgasheff considers that the Russian Far East, northern Manchuria, Korea, and Indo-China are the most highly mineralized areas, so that with stable governmental conditions and adequate financial support the mining industries should have a considerable future in these regions. China proper has a large variety of metals, particularly in the southern half, but, aside from coal, the country appears to be without large reserves of the more important economic minerals.

The next three sections of the book deal with the metals, non-metals, and fuels and contain detailed information concerning companies, output, and position in world trade. It is well known that the countries bordering the western Pacific are important producers of antimony and tungsten of which they supply 87 per cent and 62 per cent of the world's needs respectively. Torgasheff also presents figures to show that 30 per cent of the talc, 30 per cent of the kaolin, 24 per cent of the abrasives, 16 per cent of the graphite, and 14 per cent of the salt are produced in these areas. By far the most valuable product is coal, the production of which is adequate for the present needs of that part of the world. In the case of iron and steel, however, the Far East produces but one-sixth of its requirements. This constitutes one of the greatest metallurgical problems of eastern Asia for the combined reserves of the eight regions studied amount to but 3 per cent of the known iron ore reserves of the world. The present rate of consumption per capita is low, however, so that it appears probable that the Far East could produce sufficient iron and steel to care for all of its needs during the next century or so. The bulk of the known iron ore reserves are in China and the Philippines.

The last section of the book is devoted to the general conditions of the market,

the uses of the principal mineral products, and the relation of the mineral industries of the Far East to world conditions.

The volume has been published by a small printing concern in China and unfortunately is not as creditable a piece of work as can be done in that country. There are numerous maps and a good bibliography, but no index. Despite several shortcomings and overly optimistic statements, the book forms an indispensable reference volume for all students of economic geography who are interested in the future of Asia.

GEORGE B. CRESSEY

Syracuse University
Syracuse, New York

Colby and Foster. **Economic Geography for Secondary Schools.** 618 pp. 272 maps, grafs, diagrams, and photos. Ginn & Co., Boston. 1931. $1.92

This book presents the commercial world by regions and emphasizes for the various regions the leading industry or the chief commodity of each. For example, the banana industry centered in Caribbean America, coconut production in tropical coast lands, and the raw silk industry in Japan and China. Also, Germany's chemical industry; Paris, the fashion center; and Brazil, chief producer of coffee. In the United States, the regional and commodity treatment presents the lumber industry as typical of the Pacific Northwest, meat packing localized in the corn belt, raw cotton produced in the cotton belt, cotton manufacturing carried on in the New England and Piedmont districts and the moving picture industry centered in Los Angeles. Other products as wheat, coal, iron, and steel are shown in their respective regions. The world trade of the commodities presented regionally is also shown. This treatment recommends "Economic Geography for Secondary Schools" as an excellent reference book for the geography classroom library. The informational material is supplemented by excellent illustrations.

A noteworthy feature of the book for senior high-school pupils is the excellent treatment accorded the subject "utilizing the natural environment." The phase of this subject dealing with where people live is clearly presented and is supplemented by exercises which serve to visualize the distribution of population on the earth. In the section dealing with our occupations and our natural environment, the authors have emphasized the close relationship existing between human activities and natural environment.

CLARE SYMONDS

Senior High School
Quincy, Illinois

Chester Lloyd Jones. **Caribbean Backgrounds and Prospects.** 354 pp. D. Appleton and Co. New York. 1931. $4.00

This volume, stated in the preface to be "a study of the economic and social factors which have played a part" in the Caribbean, deserves the serious attention of student and teacher of that region even tho it will probably be found less useful for regional work than its title alone would have led one to suspect. Frequent documentation thruout the book and the lengthy concluding bibliography reflect the care with which the author has gathered and presented his material, and, for the most part, restraint has been used in the matter of conclusions. At the same time, partly no doubt because of the very breadth of the subject, much that is attempted is not entirely accomplished.

Of the fifteen chapters, one is devoted to racial factors, one to health problems, one to education, and four to major export products, while the concluding six have to do with industrial diversification, commerce, public loans and finance. The book appears to the reader more as a collection of essays than as a finished volume on Middle America. This

characteristic perhaps justifies the emphasis placed here upon certain chapters, each one of which constitutes a more or less complete and satisfactory essay. The opening four chapters are primarily historical accounts of settlement, races, health and education and, while contributing nothing new to those fields, provide useful summaries of those problems. The chapters on export products follow a more or less stereotyped scheme. For example, Chapter 6, on Sugar, opens with an historical résumé of sugar production on the continent and in the islands, particularly its spread thru Cuba, and concludes with the effect of later competition with other regions together with its probable future. The phenomenal Cuban production is attributed to the low tariff rates into the United States, and the author finds that its future prospects in Cuba depend upon the "progress of diversification of local [manufacturing] industries." These chapters on products contain in addition information perhaps more appropriately reserved for an encyclopaedia, as, for example, the discussion of the characteristics of the banana plant (pp. 129-131). Notably reducing the possible regional value of these chapters is the constant and almost bewildering shifting of scene from place to place as the writer mentions, usually all too briefly, the local production of this or that crop. The chapter entitled "Extractive Industries" resolves itself into a consideration of petroleum which is also the subject of the chapter immediately preceding it. In "Diversification of Products" the author paints the Caribbean as a region of monoculture thru the emphasis placed on the major export products and the consequent neglect of the varied and important agricultural products which serve purely local or domestic needs. The concluding chapter "Toward Independence" contains an interesting analysis of the factors controlling the degree to which units may become independent. Climate is listed as one of these factors but no definite conclusion is reached regarding its relative importance in this particular. The book contains many statistical tables which, because they chiefly deal with the years since 1900, will be found quite useful.

RALPH H. BROWN

University of Minnesota

Griffith Taylor. **Australia: A Geography Reader.** 440 pp., 240 illus. Rand McNally & Co., Chicago. 1931

It is twenty years since Ellsworth Huntington wrote the first volume of this series, a book of 340 pages on Asia, and now the fourth book on Australia with 440 pages is published. The earlier volumes of the series specifically stated that they were intended as supplementary readers to round out the knowledge which the grade pupils gain from the textbook on geography. While no such claim appears in the Australia reader, the inference is natural that the book is primarily intended for the grade schools. If this is true it becomes evident as one reads that some of the discussion is far in advance of the grade, as for example, parts of the chapter on the Structure of Australia and the evolution of land forms in that chapter and elsewhere. On the other hand, the Foreword states in effect that the author is writing in the hope that the mature Australian who needs to know his own country more thoroly and the even less informed cousins of the Northern Hemisphere will read the book. With this idea in mind the author has presented a detailed and carefully arranged discussion of Australia that deserves the reading of students everywhere. Certainly no more authoritative volume on Australian geography can be expected than one that comes from the pen of Griffith Taylor. There is thruout an ease of writing, a flowing style, and a power of description that makes the subject vivid and interesting.

Five chapters, about one-fourth of the book, are devoted to the general features of Australia, position and discovery, structure, climate, flora and fauna, and population. The remainder of the treatise presents in detail the geography of the individual states,

the adjacent islands of the South Seas and New Zealand. Taylor has included a review of the discoveries, historical development and early culture in the continent in such a way as to prepare the reader for the present adjustment, and the inclusion of this material in the way that it is done should emphasize the use of similar materials elsewhere as factors of the environment.

The reviewer has read the book with considerable profit, he has been unusually attracted by it and confesses that it is the first supplementary reader that he has read from cover to cover for some time. Most of the subject matter will be understandable by the pupils of the grade schools, but it is worth a wide reading by maturer minds. The work might easily be presented to adult readers without the designatory caption "A Geographical Reader" and a simpler reader, with much of the same materials, would fit the needs of the series of which this is a part.

ROBERT M. BROWN

Rhode Island College of Education
Providence

Charles Lathrop Pack and Tom Gill. **Forest Facts for Schools.** 336 pp., 33 illus. Macmillan Company, New York. 1931. $1.00

The book considers this country's lavishly used forest heritage, the present danger of timber famine, and the probable future development of forestry. There are five main divisions of subject matter: (1) the Tree, (2) the Forest, (3) Forestry, (4) Forest Products, and (5) Enemies of the Forest. Besides these main divisions, there is an introduction (the poorest part of the book, unfortunately), and a conclusion, giving in concise terms the problems now facing this country in regard to the conservation and proper use of forest resources. At the end of each section of work there is included a comprehensive objective test and usually suggestions for review exercises which would be attractive to students. There are also numerous diagrams in the text, most of which are simple and easily understood altho the authors would have done well to consult modern educators as to the best types to be used in some cases. As a whole, this is a sane and conservative interpretation of the forest situation in the United States which will be of particular interest to pupils in secondary schools.

MARY GWEN SHAW

State Teachers College
Mankato, Minn.